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# PROGRAM manager



# T&E





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# QUALITY WEAPONS:

# A TEST AND EVALUATION


*Dr. H. Steven Kimmel*

With the new administration in place, it may be appropriate to examine, from a test and evaluation (T&E) perspective, the defense acquisition process in its quest for quality military products, materiel, and systems.

Before we can address specific aviation, armor, munition or naval issues, it is best to have a mutual understanding of the acquisition process as we know it today. Particularly since changes (e.g., congressional actions and Packard Commission recommendations) have occurred during the past few years.

To be sure, the Office of the Secretary of Defense (OSD) is attentive to, and has established, policy to improve the quality of product, industrial base, and the military and civilian force structure. Nevertheless, to accomplish this goal, policy must be implemented by others. Certainly, the private and public sector research, development, test and evaluation communities will play a significant role in the acquisition of quality defense weapons.

If the reader seeks a bottom line early, here it is—test and evaluation is, and has been, last in line for defense investment considerations, often overlooked or ignored. This observation is not meant to be cynical, merely a testament to well-documented facts found (if sought for) by examining the budget or Defense Science Board, Government Accounting Office (GAO) findings, etc. Money alone (i.e., an increased budget allocation) will not cure the problem. The problem lies embedded within the sphere of influence fostered by our competitive sectors to bring to fruition new military technology. More often than not, the impetus to achieve a technical superiority over our numerically superior adversaries results in weapons being produced without the completion of testing, let alone readiness of the technology for production.

In addition, the following two postulates are further adding to the complexity of the problem: first, software is continuing to become increasingly important in the U.S. arsenal of defense products and, second, realistic test and evaluation is receiving an increasing amount of emphasis and attention from several factions. Hence, software and testing of military systems remain as two intertwined topics of utmost concern and importance. Congressional actions, Packard Commission recommendations, continuing GAO findings, and the Total Quality Management goal of the Under Secretary of Defense for Acquisition are sufficient reasons to seek a better understanding, in an academic sense, and a clearer picture, in a business sense, of why and how aviation, munition, or strategic defense testing must result in higher quality military products.

Defense system test and evaluation is not an end unto itself. Rather, it is a crucial, synergistic and pivotal element that must remain in balance with military doctrinal expectations. Most important, it must provide credible, trustworthy results supporting acquisition decisions.

Members of the defense development community will be challenged to ensure that quality test and evaluation becomes synonymous with quality systems. The following five facets are believed to be key challenges inhibiting the use of effective, efficient T&E to obtain quality military products.

## Focus on the Facts

The first is a focus upon facts surrounding quality system T&E from policy and execution perspectives. Testing is serious business, particularly since it is difficult to find threads of operational realism in results derived from myriad laboratory, subsystem or component research driven test environments. By itself, improving the quality of testing is a challenge, but along with credible evaluation results it can become nearly unattainable. This same challenge is experienced in having and promulgating appropriate policies to encourage effective, efficient software test planning and execution. No matter what the fidelity or extent of testing envisioned, poor planning and execution and incomplete or useless test data will diminish the perceived contribution of T&E to the acquisition process. Make no mistake, quality of the test program is an intrinsic issue with serious resource implications. A test program exhibiting high quality is likely to possess credible results useful to the evaluation community and senior decision-makers.

Throughout the T&E period of performance, the *modus operandi* ought to be checking the hypothetical against the actual. Emphasis ought to be placed on checking realism of the test, not just its plausibility. Likewise, the Packard Commission recommendation to increase emphasis and use of prototyping in the acquisition process has evolved with mixed success. Certainly, the private sector pursuit for light helicopter (LHX) prototyping was restrained by the OSD decision to focus attention upon the LHX mission equipment package. Such OSD direction was deemed necessary in light of risks and uncertainty associated with technology and schedules promulgated by the Army.

### Relationship to Operational Military Doctrine and Tactics

Another facet is the relationship between test and evaluation and its contribution to improvement of operational military doctrine and tactics. The primary challenge of this facet is the need to know about performance characterizations. This relationship is particularly evident in the aviation community where, often, high-technology solutions are procured before military tactics have been solidified. An example might be the Aquilla remotely piloted vehicle (RPV). In this instance, the period of test was unable to demonstrate the utility of the technology embedded within the airframe. In addition, one need only imagine diverse operational sorties that might emerge for tactical airframes consisting of exotic composite and/or radar absorbing material such as the Air Force and Navy tactical fighter and attack aircraft. In the end, T&E must assess system performance claims via demonstrated capabilities.

Meanwhile, test and evaluation continues to be recognized as a key element of the weapon system process. By long-standing practice and directive, weapon system test and evaluation is divided into two principal categories—development test and evaluation (DT&E) and operational test and evaluation (OT&E). As defined by the governing Department of Defense Directive 5000.3, "Test and Evaluation," DT&E is conducted throughout various phases of the acquisition process to ensure acquisition and fielding of an effective and supportable system by assisting in the engineering design and development process and verifying attainment of technical performance specifications, objectives and supportability. The OT&E is the field test, under realistic conditions and by typical users of the weapon system (or element thereof), to determine its operational suitability and effectiveness.

By long-standing practice and directive, weapon system test and evaluation is divided into two principal categories—development test and evaluation (DT&E) and operational test and evaluation (OT&E).

While DT&E emphasizes engineering design and technical performance, its ultimate goal, like that of OT&E, is to ensure the acquisition and fielding of systems that are effective and supportable in combat conditions. One should not expect DT&E by itself to be sufficient to fully ensure effective, supportable combat operation. Key elements of realistic testing are reserved to OT&E; e.g., operation by typical military users in as realistic representative field conditions as possible against threat-representative hostile forces. Nonetheless, it is clear that the utility of DT&E as an acquisition tool is increased when Development Test (DT) results can serve as a reliable predictor of Operational Test (OT) performance.

Similarly, in examining the formal distinction between DT&E and OT&E, one should view the test and evaluation process as a continuum of activities interwoven within the acquisition process. In reality, the maturing DT&E and initial phases of OT&E (IOT&E) do not fit into rigid or discrete compartments; both are involved with broad, system-level concerns. This relationship is a matter of ongoing interest and is often the cause of confusion and misunderstanding. In addition, recent enactments by the Congress have drawn attention to Department of Defense T&E management, execution and actions. People engaged in weapon system acquisitions need to understand the relationship of collective T&E interests that are vitally needed to support the acquisition process.

In a similar fashion, the determination to know when to model and when to simulate must be understood better. Certainly, developmental focused modeling and simulation can provide viable support to acquisition decisions. Left to themselves, private and public sectors are pursuing a class of models and simulations that can be described as "a.c.," which stands for "advocacy collaboration." Many have, or can have, the tendency to grow into an elegant model providing a useful, yet limited solution, for the immediate area of focus—thereby gaining a reputation as an "advocacy collaboration."

Meanwhile, many believe testing is becoming increasingly more expensive and less credible, rather than more realistic. This trend must be reversed, even in light of limited airspace due to civilian encroachments and security concerns. One method will require "d.c." modeling and simulation. In this context a foundation for experiments

to resolve a given problem setting can have "direct correlation," and d.c., in a hierarchical fashion to build a basis for the complete spectrum of acquisition decisions, from concept through engineering and test. The objective of d.c. modeling and simulation is to satisfy the spectrum of private-sector hardware designers and materiel producers while supporting public sector strategists, tacticians, force developers and trainers as well as acquisition decision-makers. To be accepted, d.c. modeling and simulation must be operationally verifiable and analytically flexible.

### Timely Relevance and Balanced Testing

The third facet deals with timely relevance of system testing that must be in concert with program acquisition strategy. To be sure, the challenge is to bring out key information early, particularly if information clearly establishes a qualified "heroin" tested system or, perhaps, more importantly, the clearly unqualified weapon system. To hedge against the latter results, many electronic warfare and command, control, communication/intelligence systems are an evolution of a deployed or existing design. For such evolutionary acquisitions there exists every reason to suspect the original test method can be adapted successfully. The converse is equally valid. Regardless, attaining a balanced test program is a challenge in light of the complexity and synergistic relationships associated with current trends embodied in acquisition strategies and system performance evaluation criteria.

Balanced testing is achievable once functional areas of test methodology, technical resources and management realize the value-added necessity to obtain an accurate and trustworthy performance evaluation. In addition, as our reliance upon models and simulations becomes more pronounced, evaluations will become increasingly predicated upon abstract test conditions.

The combined T&E program must be structured and executed in a manner consistent with the acquisition strategy and the information needs of decision-makers throughout the acquisition process.

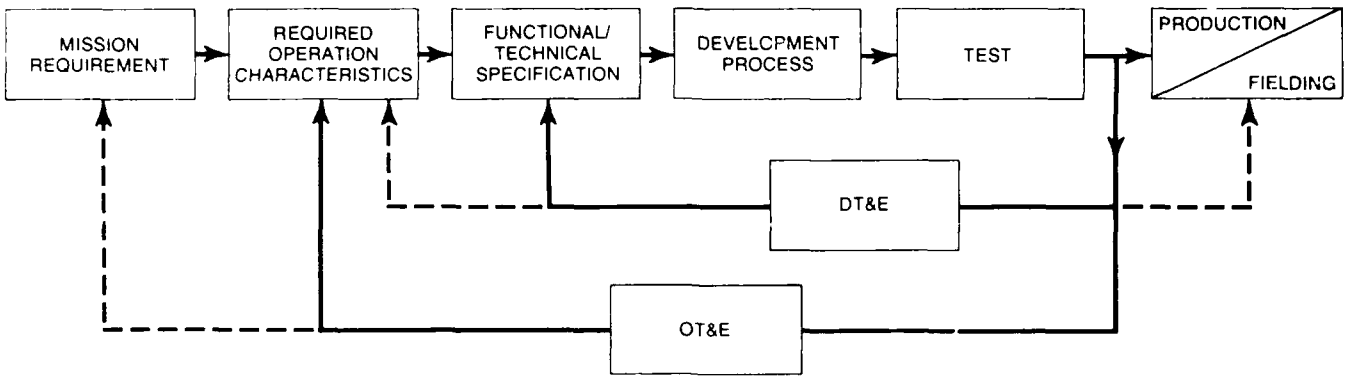
Testing alone will not satisfy our needs. The accompanying process of evaluating test results and determining the degree of achievement and satisfaction of developmental and operational requirements is the final prerequisite for balanced T&E. The combined T&E program must be structured and executed in a manner consistent with the acquisition strategy and the information needs of decision-makers throughout the acquisition process. This requires a systematic T&E program that is responsive, valid, and predictive.

### Validity Review

It follows, then, that the fourth facet is validity review, an area of immeasurable consequences. The key challenge is to record the need to review the full scope and detail of the test method, thereby reducing the perception of lighthearted relevance to the Test-Analysis-And-Fix doctrine of defense system engineering. For example, increasing recognition for software validity occurs at the precise time the Congress is calling for more comprehensive realistic testing and budget decisions, virtually making full compliance impractical. Synthetic representations of realistic military environments are challenges to be reconciled. As we approach the 21st century, it is likely that development testing will evolve into computer-based assessments of projected performance. Similarly, operational (user) testing will become increasingly important due to the nature of confirming projected "end points" on the performance envelope. We will concentrate on the major, significant aspects of weapon system performance. Meanwhile, the bandwidth of implicit, less significant aspects may in and of themselves be 5 or 10 percent off the mean, but the cumulative contribution of 50 percent degradation must not be overlooked.

In an analogous sense, computers and development tools like wind tunnels and static radar cross section instrumentation will replace, or virtually eliminate, the need for access to range or flight test time, let alone environmental testing. Prototyping emphasis will have a new dimension emphasizing software rather than hardware engineering. Meanwhile, hardware in the loop simulators will become more important as fewer hardware prototypes will be constructed before initial production decisions. Simulations consisting of real time, and manipulation of immense data bases will further lessen the need to gather and reduce physical flight test data. When and if this comes true, the aviation, electronic and munition T&E challenge will be to merge physical and abstract realisms embedded within the abyss assumptions of models and simulations algorithms into an acceptable, integral element of evaluations necessary to support the acquisition process. A major part of this challenge lies in our ability to validate software-driven simulators so that test results and evaluations can be truly representative and predictive of the weapon system performance, not just that of the simulator.

## T&E ROLE IN ACQUISITION PROCESS




Together, development test and evaluation and operational test and evaluation seek to ensure the acquisition and fielding of defense systems that are effective and supportable under combat conditions.

### Predictive Results

The fifth facet is predictive results. The key challenge is to be the Monday-morning quarterback on Saturday morning. Being able to predict tomorrow's areas of technical, development or test risk is an area requiring much attention. This is particularly important since many system requirements reflect mature "end point" performance levels, whereas evolutionary acquisitions with interim system configurations and performance thresholds can provide a roadmap to system maturity. To be effective, a balanced T&E program must be capable of extrapolating from current technical performance levels to determine the likelihood of achieving mature operational performance.

It is not feasible or practical to advocate a single process to test and evaluate the full spectrum of avionics, propulsion, material science or even naval technology intended for use in military systems. Rather, generic "sets" of approaches for different types of applications might be possible with a core of uniformity and commonalty. Such an approach is compatible with existing DOD policy, but lacks definitive support beyond Service preferences. System developers and users are reluctant to tailor performance evaluation criteria to permit the application of a "universal" method to provide accurate and complete performance evaluation results verified by historical applications. Typically, Service program offices become engaged in adapting a previously executed method as their approach. This may, at best, afford an improvement of the original method, but at the risk of perpetuating unintentional deficiencies.

It is important to note that predictive and evaluative aspects of testing can provide useful insight into the weapon system and its associated acquisition process. In a non-development item, test results may indicate a failure to achieve performance thresholds in the current configuration and an uncertainty in maintaining previous performance levels of existing fielded systems. This, in turn, can lead management to conclude their test program was not adequately structured to ensure there would be no degradation of existing capabilities.

### Summary

To be sure, even 2 percent real growth for defense spending during the next 5 years represents a major reduction from the previous period. Therefore, attention must be provided to achieve realistic and trustworthy test results to support defense and congressional decision-makers. As the defense budget reflects significant force structure reductions to include fewer ships and aircraft and weapon systems, test resources for instrumentation, targets and/or test articles will not come easily. If our activities are to remain viable, we must focus our endeavors into quality efforts that produce a balanced approach to test and evaluation; balance with expectations and, most importantly, trustworthy and militarily relevant results, be they factual or predictive. We will have failed if we evade the methodical verification of technical performance only to have the media and the Congress use test data to reach the conclusion of less-than-adequate defense system performance.

Streamlining of acquisition programs is warranted. The T&E challenge is to ensure that adequacy of planned tests will truly "test and stress" the sought-after system to provide sufficient and quality results for evaluators engaged in the decision process.

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# SHIFT AND ROTATE
# Cha, Cha, Cha!

*Dr. Michael N. Beltramo*

If the estimating professions (e.g., costing, pricing, and budgeting) are not held in high esteem, it may be because of the willingness of many of their members to accept—if not their eagerness to find—simple solutions to complex problems. These solutions are often encompassed in estimating models which do not withstand cursory scrutiny. Models purporting to estimate competitive procurement cost savings exemplify this unfortunate circumstance.[1] These models are based primarily upon wild assumptions and questionable data, but that is getting ahead of the story.

Many years ago the catch phrase "shift and rotate" was coined as an attempt to explain the behavior of a previously sole-source producer after introduction of a second production source and the implementation of split-buy competitions. This phrase originated in a 1979 TASC report in which the authors reviewed Ford Aerospace price behavior in the Shillelagh Program to develop a theoretical framework for assessing continuing production competition.[2] Their findings are summarized in a Defense Systems Management College competition handbook.[3]

"They postulated that establishment of production competition led to the following:

"An immediate price reduction characterized as downward shift of the learning curve.

"Continuing improved price reductions characterized as a rotation of the learning curve.

"It is important to note the framework was developed based on one case, applied only to the original producer and did not result in a statistically significant econometric model. The authors offered the concept as an exploratory framework."

A subsequent TASC report expanded the earlier work by investigating second-source behavior, conducting additional empirical analyses, and incorporating production-rate effects into the model.[4] The heart of the expanded effort was the "best competitive curve" which "begins with the historically derived, non-competitive first-unit cost and achieves parity with the competitive last-unit cost. It represents what might have happened had the original producer been under continuing competitive pressure from the outset." The authors noted that observed shifts and rotations "can be characterized as making up for earlier cost improvements which were possible, but were unrealized due to the absence of competitive pressure... and that the second producer... follows a cost improvement curve calculated for the original producer."[5]

To embrace this shift and rotation theory, one must commit an extraordinary act of faith and accept the following assumptions which are implied by it:

—The initial source has knowingly incorporated inefficiencies into its production process and/or is making "excess" profits.

—Product design and production complexities notwithstanding, virtually any second source selected by the government can (and will) rapidly achieve the same level of efficiency as the initial source.

—Competitive prices set by both sources will be based upon their costs with a similar but small profit included.

The first two points ignore the essential trial-and-error process in the transition from development to production and imply that most of the complex factors which interact and combine to result in a learning curve could be circumvented by competition. Even if those points were valid, the final point would override them because one must assume that pricing strategy and tactics are not applied by defense contractors in order to accept the shift and rotation theory.

At least three authors have addressed the pricing strategy issue as it relates to defense procurement from different vantage points. A report I wrote in 1987 considered the economic structure of the defense market and the applicability of duopoly theory to split-buy competitions. In particular, I noted that:

## TABLE I. SUMMARY OF SHIFT AND ROTATION ANALYSIS*

| PROGRAM | DIRECTION OF SHIFT | DIRECTION OF ROTATION |
|---|---|---|
| Sparrow AIM 7F Missile | − | + |
| Sidewinder AIM 9L Missile | − | − |
| Sidewinder AIM 9M Missile | + | − |
| Mk 46 Mod 1 Torpedo | − | + |
| CG-47 Class Ship | − | + |
| LSD-41 Class Ship | − | + |

*Negative shift indicates competitive price decrease by initial source; positive shift indicates competitive price increase by initial source. Negative rotation indicates steepening of initial source learning curve; positive rotation indicates flattening of initial source learning curve.

> Duopolists may maximize total profits by colluding and acting as a monopolist or by seeking to maximize profit for their own share of the market. Rivalry will exist when both firms are able and willing to compete with each other.... Even if firms are able to compete, they may believe that profits could best be maximized by collusion or simply by accepting the role of follower and charging a higher price for the residual quantity.[6]

In a 1985 paper, Womer looked at competitive outcomes for duopolists by applying game theory through computer simulation of a variety of pricing strategies.

He found that:

"... not any one strategy is a clear winner under all circumstances but only that cooperation can emerge as a successful strategy. In general, the strategies that are most successful are not competitive strategies....The winners are nice, that is, they cooperate unless provoked."[7]

Greer, in another 1985 paper, looked at two seller pricing strategies (i.e., "penetration" and "skimming the cream") and considered how they might be implemented within the context of restrictive DOD cost accounting requirements.[8] The effect of accounting method choices on price reduction rates was identified to enable a program manager to determine the strategy being applied and assess its impact on cost over the life of a program.

These and other work clearly indicate that a variety of pricing strategies should be anticipated as a reaction to competition. Given the strength of the logic in opposition to the shift-and-rotation theory, it was surprising that it was still seen as an issue by cost analysts and policymakers in 1987 when I was directing an analysis of case studies for recently competed procurement programs for the Naval Center for Cost Analysis (NCA).[9] Since logic had evidently not prevailed, it seemed worthwhile to examine new data to determine if the shift-and-rotation theory held.

The broader study we performed involved the synthesis of several competitive case studies performed primarily by NCA staff in order to strengthen the competition data base. Ten diverse items were covered in the case studies including ships, missiles and chaff cartridges. An important objective of the study was to evaluate analytical methods for measuring the effect of competition. Specifically, a determination was made regarding the effect of competition on sole-source learning curves.

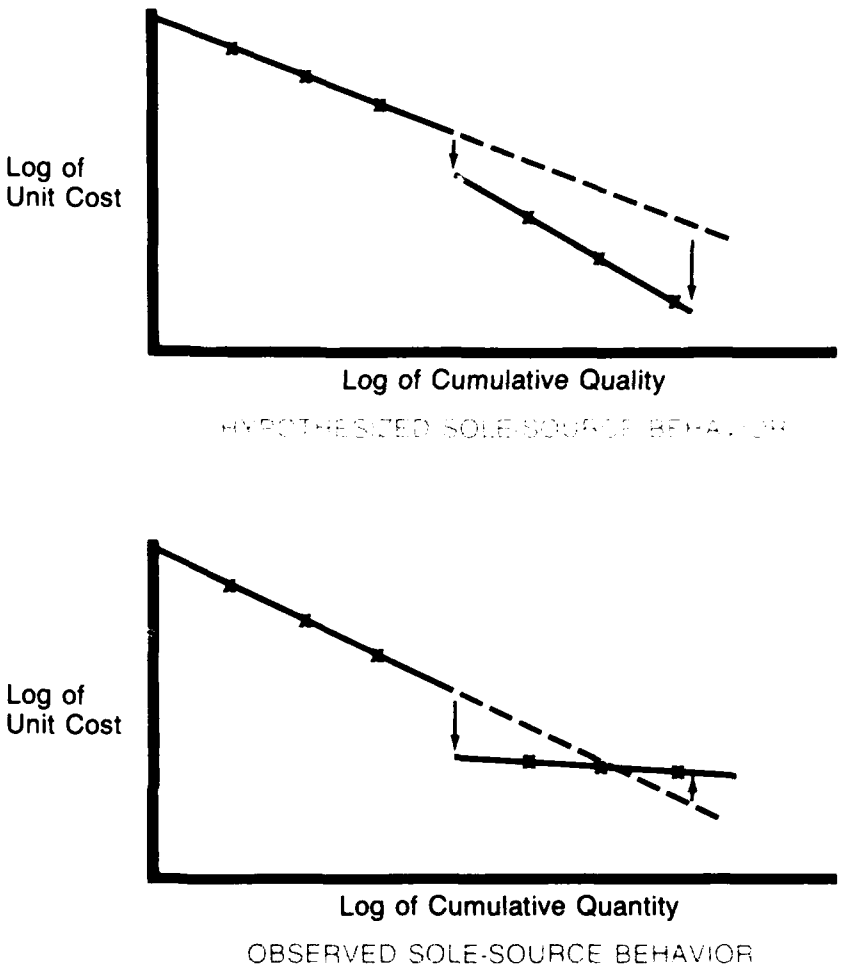
The prescribed methodology for calculating "shifts" and "rotations" was carefully applied to the available case studies whenever the data permitted. Table 1 summarizes results of those analyses. As indicated, the downward shift and rotation predicted by the theory took place only for one of the six cases examined: Sidewinder AIM-9L. That case was driven by the initial source's large profit increase between the first and second sole-source lots (an obvious skimming strategy) and its return to more normal profit levels upon the commencement of competition.

To embrace this shift and rotation theory, one must commit an extraordinary act of faith and accept the assumptions which are implied by it.

The more typically observed pricing behavior by the initial sources was a downward shift together with an upward rotation. This indicates a lower price for the first competitive lot followed by a flatter learning curve than expected for the sole source. Thus, the initial source's competitive learning curve would crossover its extrapolated sole-source learning curve and at some point the government would pay a greater price under competition. Whether this would (did) happen sooner or later depends upon the relative slopes of the two curves and the quantity involved. The hypothesized shift and rotation behavior of the initial source is shown together with the more commonly observed behavior in Figure 1.

It is apparently unusual for downward shifts and rotations to occur simultaneously. An estimating methodology based upon such a theory should certainly not be the basis of cost estimates for incorporation into defense budgets. The tendency of estimators to accept a model—any model—in lieu of *ad hoc* analysis has often proved too strong. The price which may be extracted because estimators have succumbed and accepted this nonsensical quick fix may well be significant cost overruns across a wide range of acquisition programs for years to come.

***FIGURE 1. HYPOTHESIZED AND OBSERVED SOLE-SOURCE BEHAVIOR***




## Endnotes

1. Note: They do not allow for the possibility that competition will increase costs even though data clearly indicate this has happened.

2. Drinnon, J. W. and J. R. Hiller, "Predicting the Costs and Benefits of Competitive Production Sources," TASC Report 1511, December 1979.

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# PUBLIC EXPOSURE TO UNCOMPENSATED INJURY OR DAMAGE ARISING OUT OF GOVERNMENT PROCUREMENT OF GOODS AND SERVICES



ublic liability risks for contractors providing goods and services to executive agencies, and their impacts on getting best quality competition and reliability, have been a growing concern. However, little attention is being given to the public risk of inadequate, delayed, or no compensation for injury and/or damage which exceeds a government contractor's insurance and assets.[1]

The last "catastrophic" event in the United States was the 1947 "Texas City' disaster in which 570 people were killed, 3,500 injured, and a thousand homes, industrial plants, and buildings in Texas City, Texas, were damaged or destroyed. It was caused by a commerical fertilizer product made for the government to help foreign countries increase food supplies. The loss appraisals varied from $400 million to billions. Eight years later, the Congress enacted legislation providing some compensation to the victims; the last payments were made in 1962, *fifteen* years after the event. A similar event today involving products or services purchased by the government could result in similar delays in compensating public victims.

The government is engaged in major programs and contract actions which have a serious potential for events that can be as damaging—or more so— than Texas City; military munitions and equipment, air traffic control, space vehicles, superconductors, toxic fuels, and other state-of-the art technologies. Even mundane government programs have a potential for a Texas City event.

## Existing Legislative Authority To Indemnify Contractors

Some executive agencies have discretionary authority under existing legislation to indemnify their contractors against third-party liability. Public Law 85-804 can be used to indemnify contractors for public liability arising out of "ultra-hazardous" activities. The 10 U. S. C. § 2354 authorizes the Department of Defense (DOD) to indemnify its R&D contractors. The Price-Anderson Act (42 U. S. C. § 2210d), as amended, requires the Department of Energy (DOE) to indemnify its contractors against public liability resulting from a "nuclear incident." There are specialty indemnification statutes available to particular agencies for specified activities; the Department of HHS for research and investigation contracts (42 U. S. C. § 241), Veterans Administration for medical and prosthetic research contracts (38 U. S. C. § 4101).

Except for the DOE Price-Anderson Act contractor indemnification authority, existing statutes are seldom used. In 1984, the DOD included an indemnification agreement in only *fifty* of the more than 14 million contracts it made. (Testimony by Mary Ann Gilleece, Senate Committee on the Judiciary, the 99th Congress, 1st Sess., June 11, 1985). The National Aeronautics and Space Administration (NASA) recently began using its indemnification authority under Public Law 85-804 when the cost of contractor insurance skyrocketed and major contractors refused to undertake hazardous contract work. Likewise, the Department of Transportation (DOT) opted to provide indemnification under Public Law 85-804 when major companies refused to bid on contracts to upgrade the DOT air traffic control system.

When major companies refuse to undertake contract work for the government because of potential public liability risk, important research and development and production can be delayed, less qualified and financially poor contractors may be used, and the public exposure to uncompensated injury and/or damage increases. Smaller companies *can* easily assume there is little risk for them since their assets would not begin to cover a catastrophic event; and they might not be around when it occurs. Some large companies often focus on quarterly and year-end profits rather than long-term risks and their ability to compensate the public in the event of a catastrophic event.

## Recent Contractor Indemnity Proposals and Recommendations

In the past several Congresses, bills have been introduced which would expand authority for indemnifying government contractors, but none has become the law. Most did not focus on potential exposure of the public to uncompensated injury and/or damage; authority would continue to be discretionary; and no indemnification would be provided for "commercial products," liability due to negligence or willful misconduct of a contractor, or for defects in a product about which a contractor knew or should have known.

In 1983, the American Bar Association (ABA) adopted a resolution endorsing the principle of government contractor indemnification. Subsequently, the ABA Public Contract Law Section proposed a self-executing statutory indemnification concept which would cover government contractors, their subcontractors, and suppliers for public liability in excess of "reasonably available" insurance. This concept avoids incorporating an indemnity agreement into every contract, eliminates discretion by executive agencies, and invokes government indemnification after a public liability event occurs and a contractor asserts its liability exceeds "reasonable available" insurance. However, the section's proposal and the pending implementing bill introduced during the last session of the Congress (H. R. 2378) exclude liability for "commercial products" or resulting from "willful misconduct or lack of good faith" on the part of a contractor.

None of the proposals adequately addresses the exposure of public victims to uncompensated losses. The hearings on H. R. 2378 reflected a lack of focus on public protection. The proponents, primarily industry representatives, concentrated on legislation ("ultra hazardous"), and inconsistent use of existing discretionary authority by executive agencies.

The Department of Justice (DOJ) and Department of Defense (DOD) asserted there is no need to expand indemnification because the government is not having difficulty in getting companies to compete for contracts; and more indemnity would result in larger payments on claims because of the government's "deep pocket." These opponents assert that indemnification would relieve contractors of responsibility to assure their products were not defective.

A recent study of government contractor indemnification made for the Administrative Conference of the United States concluded the government has not had to make payments under its contractual indemnity agreements during the past 30 years. While this study acknowledges there is a need to address the problem of mass injury and mass loss to the public from catastrophic accidents in government programs, it makes no recommendations to answer the problem.[2]

That the government has not had to make payments pursuant to its contractor public liability indemnity agreements, or that some companies are willing to contract without an indemnity, is not an adequate answer. The basic issue is whether the government is adequately protecting its citizens against loss or damage resulting from government programs and activities requiring the purchase of goods and services.

The government, as a buyer, is using contractors to supply goods and services the government determines are needed for programs and activities the government decides to undertake. In that sense the government is responsible for losses or damage suffered by the public resulting from its program and contract actions.

However, limitations on victims' rights to sue and recover directly from the government under the Federal Tort Claims Act (FTCA) leave victims exposed to being uncompensated where a contractor's insurance and assets are less than the total monetary loss. It exposes victims to expensive and lengthy legal proceedings and innumerable defenses by contractors against tort liability. Even where the government can be held liable under the FTCA, victims can be uncompensated for a long time and subjected to lengthy and expensive litigation.

## Government Contractor Defense

Recently, the U.S. Supreme Court decided four cases involving the so-called "government contractor defense" against tort liability arising out of alleged defects in the design and manufacture of products, or services, the contractors provided to the armed forces. All involved claims by estates and heirs of military personnel killed while using aircraft manufactured or serviced by the contractors. Boyle v. United Technologies, Grumman Aerospace Corp. v. Shaw, Dowd v. Textron, Inc. and Tozer v. LTV Corp.

The Departments of Justice and Defense asserted there is no need to expand indemnification because the government is not having difficulty in getting companies to compete for contracts.

In Boyle, the Court (5 to 4) decided such defense was valid in certain situations although it remanded the case to the lower court which had held the contractor was excused from liability. In Grumman, the Court denied review of a lower court decision that the contractor was liable. In Dowd and Tozer, the Court denied review of lower court decisions that the contractors were not liable. While there is seemingly legalistic confusion in the reasoning of the cases, confirmation of the principle of the "government contractor defense" by the Court may reduce some contractor concerns about potential tort liability; at least for some products and services provided to the armed forces. However, none of these cases involved a catastrophic event like the Texas City disaster nor resolve the problem of public exposure to uncompensated injury or damage when a government contractor's tort liability exceeds its insurance and assets.

### Self-Executing Comprehensive Contractor Indemnity Based on Price-Anderson Act

We believe the government has an obligation to assure the public that victims of events caused by goods and services supplied by contractors will be promptly and adequately compensated. As discussed, providing discretionary indemnification authority to contracting agencies has not achieved this result. A partial solution is for the government to provide by statute a self-executing indemnification of government contractors for public liability in excess of agreed-upon amounts of insurance, or what is a reasonable amount of insurance at the time a catastrophic event occurs; coupled with requirements for waiver of defenses; a mechanism for allocating compensation if the amount of injury and/or damage exceeds (or is likely to exceed) the ceiling on indemnification and aggregate liability of the persons indemnified; and an up-front commitment by the Congress to require and consider "compensation plans" for victims proposed by the President when the total amount of injury and/or damage exceeds these ceilings.

An adequate framework for this indemnification concept exists under the recent amendment to the Price-Anderson Act renewing government indemnification of DOE contractors for public liability arising out of a "nuclear incident." It increases the ceiling on indemnification and aggregate liability of DOE contractors to approximately $7 billion for a domestic incident; provides federal court jurisdiction over indemnified claims; requires allocation of compensation where the total amount of claims may exceed the ceilings; permits the government to require waivers of defense; bars punitive damages; and mandates the submission to and review by the Congress of "compensation plans" when claims exceed the statutory ceilings on liability and indemnification.

The Price-Anderson Act indemnification covers DOE contractors, subcontractors, and suppliers at all tiers and is applicable without regard to negligence or misconduct on the parts of the persons indemnified. There is no exclusion for "commercial products." This umbrella indemnification protects the public regardless of who supplied the product or service which causes the "nuclear incident" resulting in injury and/or damage.

The Price-Anderson Act indemnification covers DOE contractors, subcontractors, and suppliers at all tiers and is applicable without regard to negligence or misconduct on the parts of the persons indemnified.

Transferring the Price-Anderson Act public protection concept to all government contractors requires some modifications.

—The indemnity must be extended to any event; not just a "nuclear incident."

—The DOE executes indemnity agreements with its prime contractors which flow down to their subcontractors and suppliers. This would be a burdensome and unmanageable requirement if applied on a government-wide basis considering the millions of contracts the executive agencies make annually, types of products and services involved and the unlikely potential of massive public injury and/or damage from most contracts. The better approach would be for the statute to provide that the United States indemnifies all of its contractors and to define contractor to include subcontractors and suppliers at all tiers.

—The Price-Anderson Act permits DOE to require its contractors to provide "financial protection" (i.e., insurance). While DOE has elected not to do so in the past (its major primes are cost-type), a general statute should specify that a contractor shall have an amount of insurance (or self-insurance) agreed upon in the contract or where not so agreed upon, in an amount available at reasonable rates ("rea-

sonably available") as determined when an event giving rise to indemnification occurs. Again, it would be burdensome and impracticable to require an agreement on the amount of insurance for each contract made by executive agencies; or to extend that requirement to every subcontractor and supplier.

Requiring public liability insurance (self-insurance) before government indemnity applies shares responsibility for loss and/or damage to the public; and utilizes expertise of the insurance industry to assure financial capability and reliability of contractors. Allowing the contracting agency to determine when and how much insurance (or self-insurance) is required in advance retains appropriate responsibility with the agency to assess public liability risks and costs; when a cost-type contract is utilized the agency can decide to waive the insurance requirements if reimbursable premium costs are considered excessive.

The "reasonably available" insurance alternative does leave a potential gap in public protection; the contractor has $500 million in public liability insurance and after a public liability event occurs the court determines $600 million was "reasonably available." This means the government would only indemnify losses above $600 million. If the contractor did not have the $100 million difference, the public could be exposed to some uncompensated loss; and the other protections under indemnified claims might not be applicable. However, there does not appear to be any other practicable alternative for an efficient and manageable government-wide contractor indemnification system. Should the situation described above occur, the Congress can legislate an exception to cover the gap.

Adopting a self-executing, government-wide indemnification statute based on the Price-Anderson Act concepts provides the following benefits:

—It would conform to an established congressional precedent in the existence and amount of indemnity to protect the public, and in the mechanisms to assure the public it will be promptly and adequately compensated.

—It would reduce concerns of government contractors about risks and help ensure the best companies compete for contracts with all executive agencies.

—It would eliminate sporadic and inconsistent use of existing discretionary indemnification authority by executive agencies.

—It would counter the self-interest concerns and skewered objections by opponents of government contractor indemnification.

The PRT recognizes its contractor indemnification proposal does not address the issue of uncompensated public injury or damage when a government contractor is excused from tort liability under the "government contractor defense," and the government is not liable for such injury or damage under the FTCA. Thus, there still could be a catastrophic event where the public has no legal remedy.

One solution to this potential situation is to make the government "strictly liable" for public injury or damage caused by its programs, and to amend the FTCA by repealing the discretionary action provision. Alternatively, it could be addressed by the Congress establishing an administrative forum for hearing and deciding public claims for injury or damage when contractors are immunized from the liability.

## PRT Conclusion

The Congress should:

—Enact a self-executing government-wide indemnification statute based on the Price-Anderson Act concepts;

—Amend the FTCA by making the government strictly liable for public injury or damage caused by its programs and by repealing the discretionary action provision;

—Establish an administrative forum for hearing and deciding public claims for injury or damage when contractors are immunized from the liability.

## Endnotes

1. A 1963 report by the Columbia University Legislative Drafting Research Fund concluded there was a need to protect the public and recommended a legislative solution. The 1972 report of the Commission on Government Procurement (COGP) addressed this issue and recommended the Congress enact legislation "to assure prompt and adequate compensation for victims of catastrophic accidents occurring in connection with government programs." COGP Report. Vol. 4, Part H, p. 100. The COGP recommended legislation to provide indemnification of government contractors, above available insurance, for public liability occurring in connection with a government program. Id., p. 100. For an overview of past legislative initiatives see Dembling, "Catastrophic Accidents: Indemnification of Contractors Against Third Party Liability," *Journal of Space Law*, Vol. 10 No. 1 (1982).

2. Professor Frank P. Grad, Columbia Law School, "Contractual Indemnification of Government Contractors," Sept. 23, 1987; revised April 1, 1988. On June 9, 1988, the Conference adopted a recommendation entitled "Federal Indemnification of Government Contractors" (88-2) based on Professor Grad's study. It did not address the issue of public exposure to uncompensated injury or damage and abstained on whether existing legislative indemnity authority should be expended. The recommendation only proposed procedural actions to compile information and assess "risks" when deciding whether to indemnify contractors under existing authority.

*This is a report of the Procurement Round Table approved by two-thirds or more of its directors.*

# DSMC GRADUATES HEAR NAVY ADMIRAL SPEAK OF PEACE THROUGH STRENGTH

*Admiral L. A. "Bud" Edney, USN*
*Vice Chief of Naval Operations*

These proceedings formally mark the completion of significant efforts on your part and you are to be congratulated for fulfilling the rigorous requirements of this course. In the process, you have measurably increased your knowledge, and return to your parent Services, or other organizations, better prepared to take charge and have a positive impact on a wide variety of important programs through the application of proven management and leadership techniques that are now inculcated in your management style.

You leave here to assume a leadership role in some of the most demanding, yet rewarding, defense acquisition programs your Services or companies have to offer. The importance of those positions to the defense of this country, and the importance of this College in preparing you for them, cannot be overstated and is underscored by the *law* requiring major program managers to be graduates of this course. As you assume these significant responsibilities, you should do so with a new set of tools, increased confidence, and an enthusiasm to get on with the task at hand.

I know you will find the months ahead challenging and interesting. For the ancient Chinese, the greatest curse was to be condemned to live in "interesting times"; that is, times of rapid change and turmoil. I don't see that as a curse at all, but as an unequaled opportunity to play a meaningful role in shaping the future. If we do our jobs right, the turmoil will be reduced and the change will be orderly and produce progress.

As our country looks to that future, it is clear that as the leader of the Free World, our military commitments and the requirement for peace through strength will remain unchanged and, in my judgment, increase. This is true even in the face of recent Soviet arms reduction initiatives which are likely to have a dramatic impact in the arena of intellectual debate and very little impact on U.S. worldwide commitments for the foreseeable future. It is equally clear that fiscal pressues placed on balancing the national budget and getting our expanding debt under control will require us to perform our missions under increasing budgetary constraints.

Those diametrically opposed forces—stable or rising commitments and falling budgets—will require each of you to apply tough, disciplined management techniques in applying limited resources to enable your programs to remain on schedule and produce a quality product to the user, our American service men and women.

No matter what that particular program is, in order to meet the needs of your *service* and your *user*, you must produce a product with a number of similar characteristics in comparison to what it will replace.

It must be more *reliable* to minimize cost for spares and maintenance.

It must require *fewer operators* to minimize required manning levels.

It must be as *simple* as possible to minimize training requirements for operators and maintainers.

It must *avoid goldplating* like the plague to minimize procurement cost, or we will price ourselves out of the next generation of weapon systems to the detriment of our defense requirements.

Systems that meet these competing requirements don't just happen. They come to fruition because people like you exert *discipline* on the procurement process and force it to develop what is *needed*, not what the system wants to provide on its own inertia. "Nice-to-haves" are fine under the Christmas tree, but they don't belong in the defense budget. We are going to have enough trouble finding the money for the "must-haves" in the coming budgets.

In these days of "mushrooming" new technologies, you must be doubly aware of the dual edge to this sword. Advanced technology is a great tiebreaker in our business. It can solve problems today we never dreamed of solving in years past. In our business, those problems are called threats and the failure to counter them can be fatal. The problem is that *technology costs money*. In the world of auto racing there is a saying: "Speed costs money; how fast can you afford to go?" The same can be said in the procurement of complex military systems. The solution is to buy the right amount of technology to meet the requirement and accomplish the mission. Once you have decided on the right mix of technology, adding on "nice-to-haves" will generate cost overruns, with program delays the inevitable result. Any less than the right amount of technology and your *user* gets a system he can't fight and win with.

It is critical that you establish a meaningful two-way dialogue with the *user* very early in the development process. A thorough understanding of the user's operating environment is essential in this process. Without this insight, you may, with the best of intentions, develop totally unrealistic system specifications and designs. All too frequently, trying to reach the last 5-10 percent of capability written into the specifications introduces excessive costs and time delays to essential programs. Frequently, these decisions and limits are better understood as we get into a program. Yet, the original specifications often are not changed and our test and evaluation plans test to these specs which in reality are unrealistic or not achievable within time and money constraints. The early and continuing dialogue among user, developer, and the test and evaluation force is essential to a successful program.

The question of life-cycle cost and its impact on your acquisition strategy is a concern to me. We don't need programs that attempt to hide essential costs in pre-planned product improvements or ECPs which are *required* before the system can properly perform its mission. I'm concerned about not addressing total training and simulator requirements and costs up-front. That just means the system starts with built-in cost overruns that can't be properly addressed until far too late in the game. This usually means the operator pays the price. Even though the product is delivered on time, if the operator isn't trained to use it, or the technical manuals to maintain it are not distributed, it is of limited value.

I charge you to address the *total process* when you structure your program. I am not suggesting that the logistic "tail" should be made to "wag the dog," but it must be planned well enough that things like tech manuals, training courses, and system simulators are available when your *user* needs them. If you don't plan for them up-front, our sailors, soldiers, airmen, and marines in the field will probably find a way around the problem. God bless 'em, they always do, frequently shooting themselves in the foot in the process. They deserve better, and it's *your* job to provide it.

The real challenge is that as a super power and leader of the Free World, your program must be designed to operate with adequate support in whatever area of the world we are tasked to operate it. We do not have the luxury of being able to provide our operators with systems that are one-dimensional or limited to unique environmental requirements.

Fortunately, there are tools at hand to help you in your task, and more are on the way. I think Dr. Costello's emphasis on total quality management will be one of the keys to your accomplishing overall improvements. His theme of getting quality in up-front, and not after the fact through Q. A. Inspectors, hits the nail on the head. It's not a new program, as such. It should always have been fundamental to how we do business. I believe our success in meeting total quality management goals will be the key to meeting future military requirements in an era of dwindling resources. We simply *must* have quality up-front in our procurement organizations, but we must do it *intelligently* to maximize our readiness and reduce costs.

I have a few comments on "Operation Ill Wind," the current defense procurement abuse situation, which has received extensive coverage in the media, and will continue to do so with damaging headlines as prosecution of alleged violations are addressed in the courts. What these headlines will not say is that an ex-military man identified the wrong, reported it to the military authorities and the Navy's investigatory service flushed out the wrong to hold accountability within our legal system. We all understand that anyone connected with defense procurement must be held accountable for eliminating waste, fraud, and abuse and upholding the public trust we all accept for getting the most for each scarce defense dollar entrusted to our care. In the vast majority of cases, that is exactly what is happening, because the military-industrial complex is made up of dedicated, hard-working Americans with the highest standards of integrity. As the ensuing story unfolds, we cannot and must not let the human weaknesses of a few characterize the performance and contribution of the vast majority of outstanding individuals in this vital industry.

There are more than 134,000 people directly involved in acquisition in the Department of Defense dealing with untold numbers of counterparts, likely in the millions, in defense contractors around the country. Of these, it appears that only a small handful have actually abused their public trust. We must not allow the thousands of hard-working, dedicated public and private citizens in acquisition to be tarred with the same brush used on the few bad apples. They deserve much better. We must all get that message out. The simple fact is that our business requires the integrity of the individual and no amount of reorganization can correct a fundamental breakdown in that integrity. I believe civilian hiring freezes and cuts in the name of efficiency while increasing the complexity of the acquisition process through firm fixed pricing, dual-source competition and other initiatives have placed great demands on the system. They have generated increased reliance on contractor support which introduced a middleman into the picture and provided a conduit of information and obvious temptations for a few that placed greed ahead of creed. These people do not represent the military-industrial process. We will flush them out and hold them accountable. Our task is to get on with the job at hand and be proud of the role we collectively play in providing the common defense.

I wish you all "fair winds and following seas" as you depart for your assignments.

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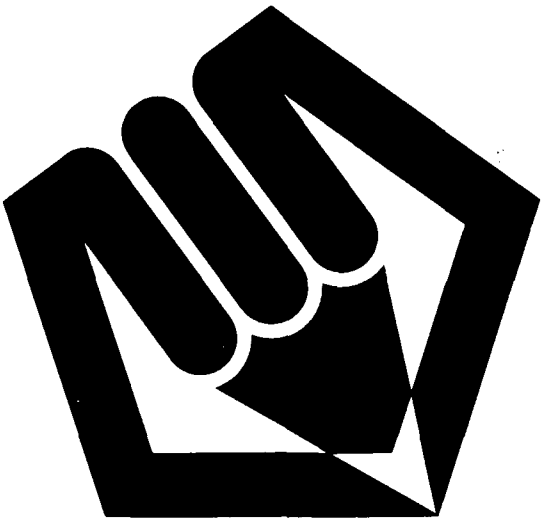
*Admiral Edney was the keynote speaker at the PMC 88-3 commencement December 16 at the Defense Systems Management College. He is a member of the DSMC Policy Guidance Council.*

# C A L L F O R P A P E R S



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2. *Actions taken on TQM and the other nine initiatives of Dr. Robert B. Costello, Under Secretary of Defense for Acquisition.*
3. *Actions taken on the recommendations from the "Acquisition Leadership '88 Conference" on 14 July 1988.*
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# A PROGRAM MANAGER'S GUIDE TO PRODUCING SURVIVABLE SYSTEMS

*Dr. Joseph J. Feeney*

Attaining survivability on the nuclear, biological and chemical (NBC) contaminated battlefield requires a system's approach initiated during development of the system. Nuclear, biological and chemical contamination results from the deposition and/or sorption of residual radioactive material, or biological, or chemical agents on or by structures, areas, personnel, or objects. Initial nuclear effects such as blast, thermal, etc., are not encompassed by this area. This article is patterned after a previous *Program Manager* article on nuclear survivability[1] and is intended to provide corresponding information and guidance on NBC contamination survivability.

*Nuclear (N) Contamination.* Residual radioactive material resulting from fallout, rainout, or irradiation produced by a nuclear explosion and persisting longer than one minute after burst.[2]

*Biological (B) Contamination.* Microorganisms and toxins that cause disease in man, plants, or animals or cause the deterioration of materiel.[3]

*Chemical (C) Contamination.* Chemical substances intended for use in military operations to kill, seriously injure, incapacitate, or temporarily irritate or disable man through their physiological effects.[4]

Program managers control development and acquisition of systems that may be required to survive in a nuclear, biological or chemical contaminated environment. This article outlines Department of Defense, military and service NBC contamination survivability requirements, recommends actions for program managers, and identifies resources supporting NBC contamination survivability efforts.

## What Is NBC Contamination Survivability?

The NBC contamination survivability is the capability of a system and its crew to withstand an NBC-contaminated environment and relevant decontamination without losing the ability to accomplish the assigned mission. Characteristics of NBC contamination survivability are decontaminability, hardness, and compatibility.

You will encounter these three characteristics of NBC contamination survivability repeatedly throughout the life cycle of your system.

*Decontaminability.* The ability of a system to be decontaminated to reduce the hazard to personnel operating, maintaining, and resupplying it. Decontaminability is enhanced by maximum use of materials that do not sorb NBC contaminants and facilitate their rapid removal with decontaminants, by incorporating designs that reduce or prevent accumulation of NBC contamination and provide ready accessibility for decontamination, by incorporating contamination control devices and techniques to reduce the amount of contamination, and by providing space and mounting brackets for installation of NBC detection, decontamination, measurement, and contamination control devices where appropriate.

*Hardness.* The ability of a system to withstand the damaging effects of NBC contamination and any decontaminants and procedures required to decontaminate it. Hardness refers to the condition of the equipment, including critical operational/functional performance characteristics, after it has been subjected to contamination and decontamination cycles.

*Compatibility.* The ability of a system to be operated, maintained, and resupplied by personnel wearing the full NBC protective ensemble. Compatibility requires consideration of the NBC-protected man and machine interface.

These characteristics are based upon engineering design criteria, intended for use *only* in a development setting. They *do not* define doctrinal or operational requirements for decontamination or establish NBC protection requirements.

The degree or level of NBC contamination survivability to be integrated into a system's design is based on the required operational effectiveness and survivability characteristics of the system. Once these NBC contamination survivability criteria have been formally established, they are documented in the System Specification and delineated in the Developmental Specifications written for each system.

A key point is that NBC contamination survivability is no different from any other performance characteristic. Since NBC contamination survivability falls within the purview of performance, you should manage it as a required operational capability.

### Why Build an NBC Contamination-Survivable System?

It is Department of Defense policy that NBC contamination survivability shall be included in the design and acquisition of systems that must perform mission essential functions in an NBC environment. This includes conventional forces, non-strategic nuclear forces, strategic nuclear forces, special operations forces, and supporting command, control, communications and intelligence systems.[5]

This policy was developed because the primary strategy for ensuring the security of the United States is the continued deterrence of chemical, biological and nuclear warfare. The design and acquisition of NBC contamination survivable systems enhances the deterrent value of our forces by increasing the degree of uncertainty about the effectiveness of a chemical, biological or nuclear attack by the enemy. In the event that deterrence fails and chemical, biological or nuclear weapons are employed against the United States, deployment of NBC contamination survivable systems ensures that our forces will have the military equipment necessary to perform critical wartime missions on the NBC-contaminated battlefied.

### What Are DOD NBC Contamination Survivability Requirements?

The DOD Instruction 4245.13, "Design and Acquisition of Nuclear, Biological and Chemical Contamination Survivable Systems," is the central DOD document providing NBC contamination survivability policy. This Instruction provides general management and documentation requirements for the survivability of systems designed and acquired to perform mission essential functions in an NBC-contaminated environment. This Instruction, intended for use in conjunction with DOD Instruction 4245.4, "Acquisition of Nuclear-Survivable Systems,"[6] calls for consideration of the effects of residual radiological contamination and chemical/biological agents and their decontaminants on the design and acquisition of systems. The DOD Instruction 4245.13 applies to all programs, systems and subsystems designated as major system acquisition programs as defined in DOD Directive 5000.1,[7] as well as any other program reviewed periodically by the Under Secretary of Defense for Acquisition, USD(A), under exceptional management procedures. Execution of the provisions of the Instruction for non-major systems is the responsibility of the military services.

Since NBC contamination survivability falls within the purview of performance, you should manage it as a required operational capability.

The DOD Instruction 4245.13 supplements the existing DOD series 5000 Acquisition Directives and Instructions.[7,8,9] Military service Regulations and Instructions[10,11,12] have been revised or created to address NBC contamination survivability requirements.

### What Is Required to Satisfy These OSD Requirements?

For those military services and DOD agencies designing and acquiring systems to be NBC contamination survivable, DOD Instruction 4245.13 contains the following additional requirements.

Each DOD component is required to:

—Assess NBC-contamination survivability and identify vulnerabilities and associated risks for systems with NBC contamination survivability requirements.

—Present cost and operational tradeoffs to the Defense Acquisition Board at Milestone I. For the Army Streamlined Acquisition Process, this will occur at the Milestone I/II Program Decision.

—Ensure that non-major, mission-essential systems are scrutinized closely for potential impacts on mission-essential functions.

—Develop and employ procedures similar to those contained in DOD Instruction 4245.13 to ensure that these non-major, mission-essential systems exhibit appropriate NBC contamination survivability.

—Advise the USD(A) at each milestone review if another major or non-major system has become a critical survivability limitation in the operation of the major system under development.

—Develop NBC contamination survivability criteria and standards and submit them to USD(A) for review.

The CRDEC has provided management and technical information for you and your contractors by publishing several handbooks.

Although not specified as program-manager responsibilities, you may be required to execute the following NBC contamination survivability procedures to achieve and verify your system's NBC contamination survivability.

—Employ a proper combination of cost-effective survivability techniques, not just NBC contamination survivability of individual force elements. To accomplish this, you should consider 1) materials and coatings that resist or minimize absorption of NBC contamination and/or facilitate rapid decontamination; 2) designs that resist accumulation of NBC contaminants on exposed surfaces and/or that are readily accessible for decontamination; and, 3) devices and procedures that reduce personnel/system contamination hazards by lowering NBC contamination levels and/or preventing the spread of NBC contamination.

—Balance the survivability of the system under development with all systems that must function to accomplish a much larger wartime mission.

—Include in the Defense Acquisition Board process a careful examination of system NBC contamination survivability and the potential impact of each system on larger wartime functions.

—Include NBC contamination survivability management-level summaries and resource allocation summaries in these documents: Justification for Major System New Start (JMSNS), System Concept Paper (SCP), Decision Coordinating Paper (DCP), and Test and Evaluation Master Plan (TEMP).

—Document plans for validating and confirming NBC contamination survivability, including specification of adequate resources for test and evaluation, for major and designated weapon system TEMP.

—Include an NBC contamination survivability status summary as a part of the scheduled test and evaluation briefing given 15 working days before a Defense Acquisition Board meeting according to the Milestone Review process.

The single, most important thing you must do is to document your actions pertaining to the NBC contamination survivability of mission-essential systems, subsystems and components. This is especially important if you trade off achieving certain aspects of NBC contamination survivability for cost and/or operational effectiveness considerations.

—Define NBC contamination survivability requirements using system performance and environmental criteria and verifiable design specifications that are insensitive to minor changes in the threat environment.

—Validate and confirm NBC contamination survivability through a combination of realistic testing, simulation testing and analysis.

—Establish procedures for system survivability reassessments during the system's life cycle. As a minimum, survivability should be reassessed in conjunction with major modifications, changes in mission or changes in the threat.

—Include in the acquisition strategy an NBC contamination survivability maintenance and surveillance program to support the operational phase of life-cycle NBC survivability.

—At present there is no DOD-level agency that provides NBC contamination survivability guidance. Nevertheless, with the Army in the forefront in the NBC contamination survivability area, the Army has designated its Chemical Research, Development and Engineering Center (CRDEC) as the Army lead agency in NBC contamination survivability. The CRDEC has established a focal point, its NBC Survivability Office, to provide technical advice on all aspects of NBC contamination survivability. The CRDEC can assist you in the development of the NBC Contamination Survivability Program Plan for your system and provide information concerning state-of-the-art NBC contamination survivability technology and management techniques. The Army Nuclear and Chemical Agency (USANCA) is the staff manager for its NBC contamination survivability criteria, and the Army Test and Evaluation Command (USATECOM) can assist you in identifying appropriate test facilities for compliance testing in the NBC contamination survivability area.

—The CRDEC has provided management and technical information for you and your contractors by publishing several handbooks. These unclassified publications can be obtained from several sources:

1) CRDEC, ATTN: SMCCR-NB, Aberdeen Proving Ground, MD 21010-5423; 2) Defense Technical Information Center (DTIC), Cameron Station, Alexandria, VA 22304-6145; and 3) Chemical/Biological Information Analysis Center (CBIAC), Edgewood, MD 21040. These handbooks include design guidelines to minimize contamination and to facilitate decontamination, test information on some NBC materials, general guidance for addressing NBC contamination survivability, and methodology for applying Army NBC contamination survivability criteria to a specific piece of equipment (0.5 Kw generator).

These handbooks provide guidance that is applicable to all development and acquisition programs of mission-essential equipment within the Army and can be utilized by other Department of Defense components in addressing their NBC contamination survivability requirements.

Each Department of Defense component can use different procedures to attain NBC contamination survivability including trade-offs for cost, operational effectiveness, etc. It is your job to implement the most cost-effective approach for achieving NBC contamination survivability.

### What Does My Military Service Require from Me?

Each military service has, or is developing, Regulations and Instructions for implementing policy concerning the design and acquisition of NBC contamination survivable systems.[10,11,12] In general, military service policies extend NBC contamination survivability requirements from major systems to include non-major systems. They provide guidance on commercially procured items, system retrofits, and modifications to existing item specifications, delineate procedures and specific responsibilities, establish control over waivers of NBC contamination survivability criteria, and provide establishment of post-production assurance and maintenance procedures.

### NBC Contamination Survivability Criteria

During program initiation, your military service decides whether the system is mission essential in an NBC contaminated environment. *If it is, the system must be NBC contamination survivable.* If NBC contamination survivability is determined to be a necessary requirement, criteria need to be established. For example, NBC contamination survivability criteria for Army systems are established[10] and monitored by USANCA. These criteria, expressed in terms of percent degradation, have been provided for Army systems. You integrate the NBC contamination survivability criteria into your system via the normal systems engineering process.

### How Does OSD Review Systems For NBC Contamination Survivability?

At the Office of the Secretary of Defense level, the acquisition of major systems is monitored during a sequence of Defense Acquisition Board milestone reviews, beginning with Milestone I which initiates the Demonstration and Validation Phase, for the Army Streamlined Acquisition Process, Milestone I/II, Proof of Principle Phase; and, perhaps, through Milestone III, which begins the Production-Deployment Phase. A system's NBC contamination survivability may be reviewed by the Office of the Secretary of Defense before any milestone in accordance with DOD Instruction 4245.13. These reviews may be requested at any time by the Under Secretary of Defense for Acquisition, through the cognizant Deputy Under Secretary of Defense (DUSD), Assistant Secretary of Defense (ASD), and in consonance with the Assistant to the Secretary of Defense (Atomic Energy). These reviews usually will take place before Milestones I and II (Milestone I/II for the Army's acquisition process). A review of the NBC contamination survivability status of supporting systems that must operate jointly in NBC contaminated environments may be conducted.

**NBC Contamination Survivability Program Questions will help you prepare for an OSD NBC contamination survivability program review.**

These OSD reviews examine: (1) the requirement for NBC contamination survivability; (2) the plan to achieve the required degree of survivability, including documentation and funding, (3) the plan to validate NBC contamination survivability, and (4) the plan for achieving NBC contamination survivability assurance and maintenance during the Production and Operational Phase of the system's life cycle. These plans provide the basis for your NBC Contamination Survivability Program Plan. The following NBC Contamination Survivability Program Questions will help you prepare for an OSD NBC contamination survivability program review. You can anticipate being asked these or similar questions during any OSD reviews your system may undergo.

### NBC Contamination Survivability Program Questions

1. System Mission: What is the mission of your system?

Is system mission critical/mission essential?

Is the system an essential component of other systems? Are the supported systems mission critical/mission essential?

Are other systems an essential component of this system? Are the other systems as NBC contamination survivable as this system?

What is the mission profile of this system as it relates to NBC contamination survivability? For Army systems, for example, the mission profile is based on up to a 12-hour period and is determined as follows: If the soldier performs duties like maintenance, refueling, etc., for 30 minutes every 12-hour period, then the mission profile of this system/item for NBC contamination survivability purposes is 30 minutes, even though the system/item may operate continuously.

2. NBC Contamination Survivability Requirements: Does system have an

NBC contaminaton survivability requirement?

If no, why not? Where is the rationale documented?

If yes, how is NBC contamination survivability obtained? Were cost, operational effectiveness, and other trade-offs utilized? Where is the rationale for these trade-offs documented? For Army systems, but applicable throughout the Department of Defense, is a cost and operational trade-off protocol being developed by USANCA? This trade-off protocol will contain two sample Army systems, each being evaluated against the NBC contamination survivability, as well as nuclear survivability, criteria. Is NBC contamination survivability reflected in the subsystem level documentation? Are funds budgeted for addressing NBC contamination survivability through the subsystem level?

Have NBC contamination survivability areas of high risk and uncertainty been identified?

3. Decontaminability: Is the system decontaminable?

Has the man-system interface for decontaminating the system/item been specified?

Is the system going to be painted with Chemical Agent Resistant Coating (CARC) to enhance decontaminability?

Has decontamination equipment been determined and procedures for decontaminating the system/item in the field been established?

4. Hardness: Is the system hardened against exposure to NBC contaminants and their decontaminants?

Have the critical performance operational criteria (e.g., RAM, MTBF, error probable requirements, etc.) been specified?

5. Compatibility: Is the system compatible with soldiers dressed in the full NBC protective ensemble?

Have mission essential tasks (e.g., sighting a target, loading ammunition, etc.) been specified? Human engineering comparisons of shirtsleeve performance of these tasks versus these tasks performed in MOPP IV attire are needed.

**How will life-cycle maintenance be addressed for NBC contamination survivable systems?**

Has collective protection equipment been considered for use where applicable; e.g., vans, shelters, etc?

6. Critical function analysis: Have all critical materials, critical components and critical operational functions for system and subsystem levels been specified? Where is this documented?

7. *Program Plan: Is there an* NBC Contamination Survivability Program Plan?

What concepts are addressed in the plan?

Where is the program documented?

Has there been management interface between NBC contamination survivability program and other related programs such as nuclear survivability, engineering design, human factors engineering, quality assurance and producibility programs?

Has an NBC contamination survivability program manager been identified for you and your contractors?

8. Documentation: Is the NBC contamination survivability requirement documented in requirement documents, decision coordinating papers, requests for proposals, statements of work, contracts, and others? List documents and appropriate pages.

9. Validation: What is the plan for validating NBC contamination survivability?

What is the validation concept?

Do facilities and procedures for validating exist? Where?

Have testing requirements for system and subsystem levels been determined? Has funding for required testing been budgeted? What is the status of needed testing?

Is this plan documented in the Test and Evaluation Master Plan?

Are NBC contamination survivability test reports/results from completed testing available?

10. Design Parameters: What are the features that constitute and control the system and subsystem levels of NBC contamination survivability? Where documented?

Were any assumptions made in the interpretation of the NBC contamination survivability criteria, operational specifications, etc., that affect the system and subsystem's response on the NBC contaminated battlefield? Are there any such assumptions for Government Furnished Equipment (GFE) associated with the system or subsystem?

11. Life-cycle Maintenance: How will life-cycle maintenance be addressed for NBC contamination survivable systems?

To what extent will contractors do life-cycle maintenance planning? Is it required in the Request for Proposal?

Does an NBC contamination survivability assurance plan exist? Where documented? If no assurance plan exists, what measures will be taken to assure that the specific design parameters are maintained during production?

Does an NBC contamination survivability maintenance plan exist? Where documented? If no maintenance plan exists, what measures will be taken to assure that routine maintenance, operations, and logistics will not degrade the design parameters?

Do facilities exist for NBC contamination survivability surveillance testing? If not, are they planned?

Is the life-cycle NBC contamination survivability maintenance program budgeted?

## How Do I Implement NBC Contamination Survivability?

Program management activities for developing an NBC contamination survivable system are the same as for any other system acquisition activity: acquire an operational capability and acquire life-cycle support for the capability. Once developed and/or acquired, maintaining your NBC contamination survivability capability is a must, including periodic retest and/or inspection as required.

You are required to document the NBC contamination survivability plans for your system within existing program management documentation. The above NBC Contamination Survivability Program Questions identify the minimum essential elements which should be addressed in your NBC Contamination Survivability Program Plan. The intent of the NBC Contamination Survivability Program Plan is to outline management approaches and procedures by which you propose to achieve and demonstrate NBC contamination survivability program tasks, incorporate design requirements when applicable, and conduct demonstrations, tests, or validations. Your NBC Contamination Survivability Program Plan describes how you will execute your system NBC Contamination Survivability Program.

## What Should My NBC Contamination Survivability Program Plan Contain?

The NBC Contamination Survivability Program Plan should describe the design, analyses, tests, and management activities to be performed to satisfy the full spectrum of NBC contamination survivability criteria which are decontaminability, hardness and compatibility. In the NBC Contamination Survivability Program Plan prepared by your staff or contractor, the functional relationship with other program tasks and milestones should be described clearly. This plan should identify each task with the work breakdown structure so that you can track and monitor the funds expended and planned for NBC contamination survivability activities, and so that you can document the NBC contamination survivability status of your system when called upon to do so.

Your NBC Contamination Survivability Program Plan needs to include the specific tasks necessary for design, analyses, test, evaluation, and management of NBC contamination survivability requirements. Your plan should include preparation and approval of a time and event schedule for the initiation, review, and accomplishment of each NBC contamination survivability task. Parts, materials, facilities, equipments, subsystems, and systems requirements for each NBC contamination survivability task should be identified. Labor hours, caliber of labor, and costs (labor, material, travel, testing, etc.) required for planned NBC contamination survivability activities should be estimated. Your NBC Contamination Survivability Program Plan should:

—Clearly relate NBC contamination survivability activity to critical technical and operational issues.

—Delineate the analytical efforts that supplement or replace testing to include the identification of computer software simulations, and the ways that these and other analytical techniques will be used.

—Identify piece-part, component, and subsystem tests to be performed for the appropriate NBC contaminated environments, with details such as test methods, test parameters to be characterized, etc.

—Describe system level tests to be performed including the method of extrapolation from the test environment to the threat environment, and the rationale for simulants chosen.

—Identify simulants to be employed, test configurations, exposure levels, test data to be obtained, and their relationship to analytical efforts.

—Provide the NBC contamination survivability design philosophy to include the basis for selection of materials, finishes, device technologies, circuit/mechanical designs; trade-offs or assumptions concerning the system design margins, contaminants and decontaminants, planned operational fixes, and any trade-off or assumption concerning system/subsystem/equipment operation, function, deployment or configuration that has been used in developing the NBC Contamination Survivability Program.

—Describe the application of NBC Contamination Survivability Program results to the production and maintenance of the deployed system/subsystem/equipment.

—Identify the projected requirements, driven by the NBC Contamination Survivability Program of the system/subsystem/equipment, for special or custom parts, materials, components, finishes, or processes; the basis of need for these requirements; and the impacts of these requirements on the development program and design, costs, operation, maintenance, function, or deployment.

-Identify NBC contamination survivability areas of high risk and uncertainty. Assumptions, conclusions, and reasons used in risk analysis and identification, as well as the actions to be taken to minimize impact of risks and uncertainties identified, should be specified.

—Describe the methodology and procedures by which the prime contractor will ensure that NBC contamination survivability, meeting the policy requirements of your military service Regulations and Instructions, are contained in subcontracts.

—Identify actions to be taken to ensure NBC contamination survivability for material developed elsewhere, such as commercial off-the-shelf items and performance-type military specification items.

—Identify special requirements to be included in source or product selection criteria.

—Describe the contractor's improvement action(s) when an item does not meet system or material requirements.

—Define the interactions of the non-contractor developed equipment with the contractor developed equipment and the approach to integrate the NBC contamination survivability of these equipments.

—Identify your Preplanned Product Improvement efforts and how NBC

contamination survivability requirements will be validated.

—Describe the interface in the acquisition cycle where potential NBC contamination survivability solutions will be correlated with nuclear and other survivability issues to ensure that what enhances survivability in one area does not degrade survivability in another area.

Your NBC Contamination Survivability Program Plan should be no longer than necessary to present the required information. It will be used by you, your military service, and OSD for planning, budget justification, and performance measurement of NBC contamination survivability. This Plan provides the basis and authority for all other detailed NBC contamination survivability documents and should be capable of explaining the intent of your NBC contamination survivability approach.

### How Do I Manage My NBC Contamination Survivability Activities?

Without a doubt, the first and most important step is to state clearly your NBC contamination survivability objectives in your program documents and contracts. This is to ensure that your contractor(s), vendors, operational test and evaluation command, etc., know that NBC contamination survivability is required.

A strong program manager and contractor management role is needed and is crucial to ensure that survivability goals are met. You need to manage carefully the NBC contamination survivability activities in the following areas: system engineering, human factors engineering, test and evaluation, manufacturing, and integrated logistic support.

During the system engineering process, treat NBC contamination survivability criteria as a mission requirement that will be translated into design requirements at successively lower levels of detail. If possible, assign an engineer with NBC contamination survivability experience as your NBC Contamination Survivability Manager to integrate NBC contamination survivability solutions into your system design. If you do not have NBC contamination survivability experience within your staff, use the Army's Chemical Research, Development and Engineering Center or a contractor with NBC contamination survivability experience for technical assistance. Periodic reviews of NBC contamination survivability documentation will help you maintain control of your NBC contamination survivability effort.

Your NBC Contamination Survivability Program Plan should be no longer than necessary to present the required information.

Your NBC Contamination Survivability Manager prepares your NBC Contamination Survivability Program Plan detailing the methods, policies, and guidelines necessary for incorporating NBC contamination survivability criteria into your system.

### Your Contractor's Responsibilities

You should make clear to your contractor that he will be required to perform certain NBC contamination survivability tasks. He should assign his own NBC contamination survivability manager to assist your corresponding manager in addressing NBC contamination survivability issues. Your contractor, as well as his assigned NBC contamination survivability manager, must fully understand your expectations for providing and evaluating system NBC contamination survivability.

Your contractor must understand that he needs to specify all NBC contamination survivability critical design parameters for piece-parts, materials, design and design tolerances. He must plan for sufficient lead time in scheduling test facilities and must coordinate overall test schedule with the U.S. Army Test and Evaluation Command.

Your contractor will subject your system's equipment to analysis and testing for compliance with the NBC contamination survivability criteria, which it will be expected to pass. Once you are satisfied that your system has been verified as being survivable, the contractor must be held responsible for the evaluation of every proposed design and procedural change to determine whether it would jeopardize your equipment's NBC contamination survivability. Also, he should be explicitly required to develop and furnish plans and procedures for NBC contamination survivability assurance and maintenance.

### How Do I Validate My Design?

Testing to validate your system's NBC contamination survivability is considered destructive testing. Therefore, due to the limited number of prototypes available for most systems, you most likely will not be exposing your full system to NBC contamination and subsequent decontamination. Accordingly, simulation of NBC contamination and trade-off analyses are essential activities for test and evaluation of NBC contamination survivability. No set of NBC simulants currently exists that duplicates every NBC environment.

Since your full system may not be exposed to NBC contamination and decontamination, you will need to have critical components and materials evaluated for the effects of NBC contamination and decontamination. Existing data bases may be able to provide degradation results and eliminate some testing of components and materials. Simulant testing of your full system, after all critical components and materials have been evaluated, may be a viable alternative. The impact of trade-offs such as cost, operational effectiveness, etc., of certain

You need to develop a comprehensive NBC contamination survivability test and evaluation program that includes testing, simulation and trade-off analyses.

NBC contamination survivability criteria needs to be determined.

You need to develop a comprehensive NBC contamination survivability test and evaluation program that includes testing, simulation and trade-off analyses. Your methodology must validate that your system meets the NBC contamination survivability criteria. Your Test and Evaluation Master Plan will be used by the Office of the Secretary of Defense to assess the adequacy of the planned testing and evaluation for your system, including the NBC contamination survivability test and evaluation portions. You must ensure that your system's test plans for NBC contamination survivability details the overall verification program from piecepart to system-level testing and analysis.

### How Do I Integrate Logistic Support?

Your planning for logistics begins on the Concept Exploration Phase of the acquisition process with the development of logistics support assessment plans and criteria. These criteria should include NBC contamination survivability requirements. These requirements are placed in the systems specifications to ensure that they are considered in the design of the system and serve as a basis for the Logistic Support Analysis (LSA) Plan. The LSA Plan is developed during the Demonstration and Validation Phase (Proof of Principle for the Army's Streamlined Acquisition Process) and implemented in the Full-Scale Engineering Development Phase (Development Prove-Out for the Army's process).

### What Is This Going to Cost Me?

There is a lack of data to indicate the NBC contamination survivability costs on total development of a system. However, starting as early as possible in the development and/or acquisition of your system would lower your costs. A later redesign or retrofit to achieve NBC contamination survivability can only increase the cost of your system. Starting early saves a lot of time and effort later, which further increases your dollar savings.

### Lessons Learned

*Start Early.* Start NBC contamination survivability planning as early as possible; plan for NBC contamination survivability "up front." An early start will reduce the cost and risk associated with retrofitting your system to address NBC contamination survivability.

*Experience.* The U.S. Army CRDEC can provide technical support to your NBC contamination survivability effort. Involve military service and DOD Developmental Test and Evaluation and Operational Test and Evaluation organizations early to identify the testing and evaluation necessary to validate your NBC contamination survivability design.

*Contracts.* Before you contract out tasks on your system, get experienced NBC contamination survivability advisors or consultants to review your procurement package so that you clearly state to your contractors the needed NBC contamination survivability efforts, including system performance requirements and the measures to be undertaken to verify NBC contamination survivability. Make sure that your contractor has access to all pertinent documentation.

*Delays in Implementation.* You must make your schedules known early, enforce milestones and conscientiously evaluate contractor task performance. This should ensure that long lead-time NBC contamination survivable components are available for required prototypes, that allocated space and supporting resources are available for NBC contamination survivability requirements, and that your acquisition schedule is not delayed while you retrofit necessary design changes to address NBC contamination survivability.

Starting as early as possible in the development and/or acquisition of your system would lower your costs.

*Contractor Task Appraisals.* You and the staff must keep on top of contractor progress in completing assigned tasks. This will keep your effort on schedule. Use your staff's and your contractor's NBC contamination survivability managers. Seek assistance from other appropriate government organizations as required.

*Contractor Access Documentation.* You must ensure that your contractor is provided with, or has access to, any needed documentation. Ensure that your contractor is provided specific, detailed information from preliminary

*(See FEENEY, page 34)*

# NEW INITIATIVES AND CONCEPTS FOR INCREASING ACQUISITION PRODUCTIVITY

## (Third of Series on Acquisition Management Productivity)

*Dr. Andrew P. Mosier*

*Dr. Mosier, a private consultant, joined the DSMC faculty in 1972 and served in many capacities until retiring in 1983. His career includes experience in military operations, industry, management of military R&D, and in education. He is a retired Air Force Officer.*

One of the crucial challenges the new Administration faces is to assure adequate national defense, given the deficit and likely reductions in future defense budgets. Science and technology continue advancing at astonishing rates. So do capabilities of defense systems based on these advances. Yet, improvements in Defense System Acquisition Management (DSAM)[1] processes to acquire and modernize these systems have not kept pace. The DSAM processes are not as productive as they must be to assure adequate U.S. defense in a changing, uncertain, sometimes unfriendly world. Given the potentially fatal consequences of inadequate defense and the reality of deficit-driven scanty defense budgets, I believe the only good alternative for assuring adequate national defense includes increasing productivity in defense acquisition substantially.

Past improvements in the complex and interactive DSAM processes have not done this; e.g., have not cut acquisition cycles in half, or dramatically reduced acquisition costs while increasing quality. In spite of technological progress, new defense systems take too long to acquire and cost too much to field, operate and maintain. Often, a fielded system performs as intended only after costly fixes and crucial delays in a needed defense capability.

### Opportunities Overlooked

My research indicates past management improvements were not sufficient to increase productivity substantially because policy-makers responsible failed to consider all elements affecting productivity in DSAM processes. They overlooked opportunities to increase productivity of thousands of DSAM professionals,[2] working at all levels throughout the defense systems acquisition community.

In the first article of this series, I developed a comprehensive analytical framework of the elements of acquisition organization productivity. I proposed its extensive use to identify new opportunities for increasing productivity in acquisition management. This framework included five elements: three traditional organizational elements (objectives, processes and structures of organizations); and two types of inputs to acquisition processes (traditional tangible resources—funds, facilities and people, and intangible resources—DSAM knowledge and information required to perform acquisition management jobs and tasks).[3]

President Reagan's Blue Ribbon Commission on Defense Management (Packard Commission) documented two more factors that adversely affect defense acquisition: the environments of defense acquisition, and the culture of defense acquisition management.[4] These should be added as sixth and seventh elements.

I used the first three elements to organize research on past efforts to improve management of defense acquisitions. I identified:

—Three main triggers of change in the DSAM process

—Major underlying problems that have impeded greater progress

—Past improvement approaches that have been successful and should be emulated

—Past insufficiencies (inadequacies, inabilities and oversight failures) that must be remedied, or coped with better, to expedite DSAM process improvements and substantially increase acquisition productivity.

Summarizing these findings in a second article,[5] I concluded research and actions in three interdependent DSAM areas could expedite improvements in the DSAM process. General initiatives in these areas would increase productivity of every DSAM professional, increasing productivity substantially throughout the defense acquisition process—improve quality, reduce costs, compress schedules, and hasten acquisition of intended performance for new or modernized systems.

## General DOD Initiatives

My research shows that actions under the following three general DOD initiatives to support excellence and quality in acquisition management would substantially increase productivity of DSAM professionals.

**1. Continue increasing the integration of major DSAM processes.**

Increased integration of major acquisition processes can integrate DOD acquisition strategies, eliminate incompatibilities among interacting subprocesses, reduce ineffective and redundant elements, and make essential, but often overlooked, coordination an integral part of the integrated process. This will better ensure all crucial factors are considered in major decisions and, thus, help increase productivity substantially. Table 1 lists examples of DSAM process integrations that merit emulation.

### *TABLE 1. EXAMPLES OF PRODUCTIVE DSAM PROCESS INTEGRATION*

—Development and continual integration of the cost and schedule oriented PPBS process beginning in the 1960s

—Development and integration of the performance oriented DSARC process beginning in the 1970s

—Integration of the PPBS and DSARC processes in the new Defense Acquisition Board (DAB) process now in the mid-1980s

**2. Manage constructive change of defense acquisition environments, and motivate improvements in the present defense management culture.**

The Packard Commission Report supports the conclusion that improvements in DSAM processes, per se, cannot increase productivity in acquisition management substantially without concomitant changes in two related areas: constructive change in two environments of defense acquisition (e.g., national planning and budgeting, and government personnel management); and improvement in the culture of defense management. General ideas for managing constructive changes in the environments and culture of acquisition management are in Table 2.

### *TABLE 2. MANAGING CONSTRUCTIVE CHANGE IN ENVIRONMENTS AND CULTURE*

—DOD should use a win-win strategy to "manage" constructive change actively in any acquisition management environment that adversely affects the productivity of DSMC processes. It should "manage" by coordinating with other affected agencies and focusing attention of the Administration and the Congress on specific improvements needed in the environment to benefit the acquisition processes of all government agencies (e.g., DOD, NASA, DOE and others) operating in the particular environment. This win-win strategy would increase productivity of acquisition processes of government agencies now adversely affected by current environments, and benefit everyone to the mutual credit of the Administration and the Congress.

—The defense management culture determines the quality of teamwork between the government and contractors. Good government-contractor teamwork is a prerequisite for productive development and acquisition of new systems that can support continuing achievement of national security goals. Improving teamwork is crucial. Motivating improvements in the culture requires an optimum mix of two different, potentially counteractive government motivational activities.

Mainly, it requires government initiatives, like those recommended by the Packard Commission, to motivate good government-industry teamwork in the productive acquisition of defense systems. The initiatives must be based on shared purpose and mutual confidence among DOD, industry and the Congress. Mutual confidence, however, depends on collective belief that the purposes are truly shared. This belief is based on assurance that every participant's conduct is ethical and lawful.

Unethical or unlawful behavior is a cancer in the acquisition process. Unfortunately, assurance that it is not present depends on surgical investigations and energetic prosecutions to remove and punish adequately and with certitude any person who sabotages the acquisition process and corrupts the culture of defense management. On the other hand, two many "preventive" laws and policies, and numerous inspectors to enforce them, impede the acquisition process, decrease its flexibility and reduce its efficiency and productivity. Frequent inspections are disruptive, and are often perceived as bureaucratic meddling. This inhibits teamwork in defense acquisition. It discourages industry participation, particularly by crucial second- and third-tier subcontractors and vendors, thus endangering long-term maintenance of an adequate defense industrial base.

Cooperation is required between DOD and the Congress to seek the best balance between positive and punitive motivation to improve the defense management culture and, thereby, increase acquisition productivity and preserve our defense industrial base.

3. Provide DSAM knowledge system aids that can help DSAM professionals:

—Develop a truly common DSAM language (terms, definitions and acronyms) for communicating with clarity and understanding

—Assemble, structure, inventory and store the body of DSAM knowledge and information for selective retrieval

—Search and retrieve timely relevant DSAM knowledge and information when needed in a job or task.

The beneficial interdependency of these knowledge system aids is indicated in Table 3. Together, these aids would help professionals throughout the defense acquisition community improve greatly the overall defense acquisition process. They would help professionals increase acquisition productivity substantially in all three of the general DOD initiative areas:

—Increase integration of major DSAM processes

—Promote more effective government-contractor teamwork with better trained people in a more stable national planning, budget and funding environment

—Perform respective jobs and tasks more productively.

Substantial long-term increases in defense acquisition productivity depend on progress in the first two general DOD initiatives. Successful results from the third, however, are prerequisites for real progress in the first two. The DSAM professionals at all levels plan, communicate and act to perform respective acquisition jobs and daily tasks. Many directly support the first two general initiatives. To do this more productively, professionals require aids to assemble, organize, access, use and communicate relevant DSAM knowledge and information more effectively. The rest of the article concerns the third general initiative, providing DSAM knowledge system aids based on new concepts developed with a fresh focus on increasing acquisition productivity.

## New Concepts

*The Packard Commission* provided a point of departure for a new productivity focus aimed at developing new aids to provide more relevant DSAM knowledge and information. The Commission said, "A responsible analysis of problems in the defense acquisition system must take into account the complexity and scope of acquisition programs. A responsible prescription for change must address the actions of everyone who—for better or worse—can influence these programs, from defense contractors and program managers to OSD officials and Members of Congress."[6]

## Influential Professionals

The most influential "everyones" are DSAM professionals in government and industry. For better or worse, each acts directly to influence particular programs; or acts in ways that influence other people, for instance other professionals, congressional members or news reporters, who can influence programs. Many things determine if each professional's influence is for better or worse. Major determinants are the intangible transitory job- and task-related resources, DSAM knowledge and DSAM information, which I identified as components of the fifth element of the productivity framework.

## DSAM Knowledge and Information

The DSAM knowledge and DSAM information resources, closely related, are not the same. A useful, but incomplete, conceptual distinction is that knowldege is structured information, while information is processed data associated with a purpose. Information is more transitory and situation specific. In addition, these resources differ in relation to jobs and tasks. Relevant DSAM knowledge is required for effective performance of each job and its tasks. Timely access to relevant DSAM information is required for productive completion of each task at hand. Knowledge alone, without timely information, is not effective. Together, these resources present new opportunities to increase the productivity in acquisition significantly. The DSAM professionals need both kinds of resources. Relevant DSAM knowledge coupled with timely DSAM information can help them three ways:

### *TABLE 3. BENEFICIAL INTERDEPENDENCY OF DSAM KNOWLEDGE SYSTEM AIDS*

A truly common DSAM language would facilitate all information processes, from assembly to retrieval, which together provide relevant knowledge and information when needed. Every professional's productivity would be significantly increased by aids providing easy, timely, selective access to relevant items of the body of DSAM knowledge and information, as needed in jobs and tasks at hand.

Moreover, a truly common DSAM language would help DSAM professionals communicate with fewer misunderstandings among themselves, and between themselves and others interested in defense acquisition—members of the Congress, the media and the public. Communicating, unambiguously and with fuller understanding, would amplify individual productivity increases, greatly increasing the productivity of the organizations involved.

—To integrate what each learns from both experience and through communications

—To develop truer perceptions of the whole acquisition process

—To communicate with greater understanding.

### "Knowing" DSAM Professionals

The first intangible resource input, DSAM knowledge, enters an acquisition process as the intrinsic job-knowledge of "knowing" DSAM professionals.[7]

Relevant knowledge is more effectively put into the process by selecting, for each job, a "knowing" DSAM professional with requisite knowledge to do the job right. From the start, each "knowing" DSAM professional can select and use relevant information effectively to perform the job well and cope with immediate tasks.

The "knowing" DSAM professional is more productive, with little non-productive time required for on-the-job training and less waste from trial-and-error performance. With a head-start toward higher individual productivity, "knowing" professionals contribute immediately to their organization's substantial increase in acquisition productivity.

Widely credited as a major factor in Japan's high productivity, Dr. Deming said, "We can no longer live with commonly accepted levels of mistakes, defects, material not suited to the job, (and) people on the job that do not know what the job is.[8] A major cause of the unacceptable people-condition is high turnover in professional positions. We can remedy this in defense acquisition, and increase productivity substantially, by giving priority to providing aids: to train better and select "knowing" professionals to fill vacated and new jobs; and to help incumbent DSAM professionals quickly become more "knowing."

To be a "knowing" DSAM professional meeting the demands of a particular job requires two kinds of DSAM knowledge.

—*Relevant DSAM Job Knowledge.* This is required to do the assigned job effectively and to continue learning to do it better and increase productivity. It includes: operational knowledge of what to do and how to do it in the current job and its immediate tasks; and lacking this for any task, knowledge of where to obtain relevant knowledge in time to apply it and do the task effectively.

Dr. Deming said, "We can no longer live with commonly accepted levels of mistakes, defects, material not suited to the job, (and) people on the job that do not know what the job is."

—*Knowledge of the Relevant Acquisition (DSAM) Language.* This is required to communicate clearly with mutual understanding in management of defense acquisitions. It includes: operational knowledge of the job-relevant common authenticated DSAM terms, definitions and concepts; and when this is deficient, knowledge of where to obtain the needed authenticated DSAM terms and concepts quickly in order to learn them and communicate with understanding.

Each "knowing" DSAM professional needs both kinds of knowledge relevant to the current job (and to any new job in the offing). Then each professional can understand overall objectives and policy, establish valid goals, make effective decisions, and communicate unambiguously with others concerning job objectives, tasks, problems, approaches, progress and status.

Many professional jobs in organizations above program management offices are less operational and deal with policy-making and oversight. Their scope is larger and requirements for each kind of knowledge differ.

The DSAM job knowledge required for policy-making or oversight jobs includes more functions and activities and is more varied. It is less practical to use courses to "preposition" in "knowing" professionals the specific DSAM knowledge required in each job. Each incumbent must depend more on aids to provide requisite current, relevant, DSAM knowledge and information in time to make sound policy and oversight decisions.

The DSAM language knowledge required increases enormously in scope, because policy-making and oversight encompass more functions and activities, and because competency in these jobs depends more on analytical and communicating ability. Each incumbent, needing a larger vocabulary for thinking as well as for communicating effectively with many different activities and functions, must rely on timely aids for learning new terms and concepts. For incumbents in policy-making and oversight jobs, the requirement for truly common DSAM language is acute.

I discussed the serious consequences of the lack of a truly common acquisition management language in my first article. This lack causes misunderstood communications among DSAM professionals, particularly at higher policy-making and oversight levels and, in turn, causes waste. Furthermore, this lack causes misunderstandings in media reports concerning acquisition job performance. When congressional committees and oversight officials rely on information from such communications and news reporting, they micro-mismanage producing

more waste in spite of everyone trying to communicate, report and manage as best they can!

"Knowing" DSAM professionals, with both kinds of DSAM knowledge, are the primary force for reducing "Tower of Babel" confusion in the complex defense acquisition process—and, thus, for substantially increasing productivity in acquisition management. To be effective, however, they need a truly common DSAM language.

### "Right" DSAM Information

The second essential intangible resource input, DSAM information, is entered into the acquisition process by an incumbent DSAM professional. Each incumbent searches for useful DSAM information needed to do each task at hand, selects particular information, and applies it to complete the task. To be useful the information must, of course, be timely; it must be provided to, or readily accessible by the user in time to be applied effectively. Furthermore, it must be "right"—relevant, accurate, current, uncluttered yet sufficiently complete—for doing the DSAM task satisfactorily.

"Right" DSAM information is "power." Information products are produced from data. Like crude oil, raw data must be refined, processed, inventoried and otherwise endowed with relevance and purpose to produce useful information products. The right fuel, selected by an experienced operator, is power for engined vehicles. Likewise, the "right" DSAM information, knowledgeably selected and used by "knowing" professionals, is "power" for acquisition processes to complete management tasks which achieve objectives of acquisition organizations. Each "knowing" DSAM professional should be provided the opportunity to select from various information products, the "right" DSAM information to complete each task.

Inextricably linked to the need for timely access to "right" information as "power" for each task is the fact that if we don't quickly develop aids for organizing, structuring and inventorying information for selective access, everyone will be lost in the oceans of data we are generating. In developing these aids, we should note that due to differences in levels of job knowledge, the "right" information may be different for different professionals facing similar tasks. Therefore, the aids developed must allow for differences in levels of job knowledge, and permit each professional to select the "right" DSAM information each needs to complete each immediate task.

Like crude oil, raw data must be refined, processed, inventoried and otherwise endowed with relevance and purpose to produce useful information products.

### Information-based Organization

Looking toward the future, Peter Drucker foresees "the typical business will be knowledge-based, an organization composed largely of specialists who direct and discipline their own performance through organized feedback from colleagues, customers, and headquarters." Note the key attribute of this organization—professional members directing and disciplining their performance through organized feedback; i.e., through timely information from relevant sources. Calling this an information-based organization, Drucker continues, "Businesses, especially large ones, have little choice but to become information-based....The center of gravity in employment is moving fast from manual and clerical workers to knowledge workers....Economics also dictates change, especially the need for large businesses to innovate....But above all, information technology demands the shift."[9] Defense acquisition involves many large businesses—DOD procurement (largest business in the world), prime contractors, subcontractors, vendors, and suppliers. We are seeing evidence of a progressive shift toward information-based organization in these and other large businesses.

### Productivity Aids

I believe the concepts of "knowing" professionals selecting the "right" information as "power" to execute each task are central to the concept of information-based organization. To operate effectively, an organization that is information-based must be staffed by "knowing" professionals, and supported by knowledge and information aids providing timely access to "right" information as "power" for executing each task. These concepts are central to improved application of DSAM knowledge and DSAM information resources in complex interactive acquisition processes. They are keys to increased productivity of DSAM professionals in every organization in government, industry and academia concerned with management of defense acquisition programs, or with DSAM education, research, or information assembly and dissemination missions.

To establish and achieve useful organizational objectives at a reasonable cost (operate productively), each DSAM professional needs prompt access to a continuous supply of timely "right" DSAM information. Access, however, does not assure productivity; it only opens the door of opportunity. Given access, productivity requires two positive actions by "knowing" professionals. Each, according to personal level of job knowledge, must select the "right" DSAM information for each task at

hand; then, apply the information knowledgeably to complete the task. The better the selection of DSAM information matches the professional's job knowledge and needs of each task, the greater will be the professional's productivity and, in turn, the organization's.

Enabling consistent matches of selected information with each incumbent's job knowledge and each task's needs will require DSAM knowledge and DSAM information aids for three different aspects of acquisition management. The aids should help identify and select knowing DSAM professionals for assignment to each job; help each knowing professional select DSAM information that is right for completing each task at hand and, then, apply it knowledgeably to the task; and help present and prospective incumbents quickly become more knowing by providing new knowledge needed for productive job and task performance.

## New Technology

Previous efforts to improve productivity through better inputs to defense acquisition processes focused on tangible resources—funds, manpower and facilities. They overlooked two intangible resources—DSAM knowledge and information—as potentially powerful, additional productive inputs to ongoing acquisition processes.

One cause of this oversight was that our conceptualization of these intangible resources, and of how to use them effectively in acquisition processes, were not adequate to guide productive application of emerging information handling technologies. A main purpose of this article is to start preparing conceptually to harness these technologies to improve access to the body of DSAM knowledge and information and, thus, increase productivity in defense acquisition substantially. The above concepts—influential professionals, DSAM knowledge and information, "knowing" professionals, "right" information, information-based organization, productivity aids—support this purpose.

Another cause is that necessary information handling technologies did not begin to emerge until the mid-'70s. Now, the technologies have emerged. They are increasing in capability to store and economically distribute massive amounts of information. Using appropriate combinations of traditional and new hypermedia technologies, we can selectively search, retrieve and distribute text and graphic information quickly, from large data bases and among networks of distributed data bases. These technologies include hypertext software electronic networks, object-oriented data base management systems (DBMSs), high-density magnetic storage, and juke boxes of very large capacity laser-disc storage.

An illustrative example is the very new optical publishing Compact Disc-Read Only Memory (CD-ROM) medium. Between 550 and 640 megabytes of data, about 250,000 pages or 1700 standard 5.254 inch floppy discs, can be published on one CD-ROM disc. Replicated at $5 to $10 each, and distributed by mail, saving on-line communications costs, desired text and graphical information on any of the 250,000 pages can be retrieved quickly and read by anyone with a microcomputer and a peripheral CD-ROM drive. Price of drives, between $600 and $1,500 and costs of CD-ROM publication are expected to drop substantially as the number of drives and CD-ROM products produced increase.[10]

We need desperately to increase productivity in defense acquisition substantially. To do this, we must harness these technologies to improve access to the body of DSAM knowledge and information. We are late and the need is great and growing for new DSAM knowledge system aids which can support better the education, continuing development, selection and assignment of knowing DSAM professionals to jobs in information-based defense acquisition organizations; and provide timely access to right DSAM information when an incumbent knowing DSAM professional needs it.

Unfortunately, we are not prepared organizationally. Successful development of appropriate DSAM knowledge systems depends on how the users, acquisition professionals, will be organized. In addition, it depends on how knowledge and information provided by the systems will be assembled, organized and maintained. Before we consider the knowledge systems concept, let's look at two other concepts concerning these issues: centers of management excellence, and defense acquisition corporate memory.

## Centers of Management Excellence

Every manager spends much time searching for valid answers to "Who has the knowledge?" and "Where is the needed information?" There is a trend in America to remedy this by creating infrastructures that bring essential knowledge to bear more directly on actions required to achieve an organization's objectives, and that promote sharing of relevant information needed to accomplish immediate tasks. Peter Drucker notes that management theory is entering an important period of change: "the shift from the command-and-control organization, the organization of departments and divisions, to the information-based organization of knowledge specialists."[11]

In his Foreword to the final report of the Packard Commission, David Packard said, "The Commission's recommendations are intended to help establish strong centralized policies.... In any large organization policies must be executed through discrete structures. In the large, complex enterprise of national defense, this requires that we cultivate resilient centers of management excellence dedicated to advancing DOD's overall goals and objectives."

Packard's centers of management excellence required in the large, complex enterprise of national defense appear similar to Drucker's emerging information-based organization of knowledge specialists in large businesses. In both, work to achieve overall goals and objectives will largely be done in task-focused teams. Workers in both will require relevant information from many sources to complete the tasks.

To increase acquisition productivity substantially, I believe centers of management excellence must be

developed in organizations throughout the defense acquisition community—DOD, congressional staffs, defense industry, business and academia—organized as information-based, staffed by knowing professionals, and interconnected by efficient information flows to provide professionals in each center timely access to consistent "right" DSAM information.

Drucker discusses the requirements of information-based organization and explores its problems. He notes the actual building of information-based organizations is still ahead. So is the building of centers-of-management-excellence. We should begin by considering their critical requirements for productive operation.

Productive centers at all levels in organizations, from top policy-making to lowest operational support, will each require timely task-relevant information. This requirement poses fundamental questions about the information infrastructure supporting our present complex defense acquisition processes which, in turn, are embedded in larger processes for assuring adequate national defense. The best infrastructure, however, can only provide access to, and efficient flow of, information. It can't select right information, complete tasks, or provide answers to acquisition management questions. To do this, each center also requires what Drucker calls knowledge specialists and, in this article, I call knowing DSAM professionals.

## Acquisition Corporate Memory

Each center-of-management-excellence will require means for obtaining job-relevant DSAM knowledge and timely task-related DSAM information. Based on substantial personal experience and research, I believe the best means is a defense acquisition corporate memory which DSAM professionals in centers throughout the defense acquisition community can tap for timely relevant knowledge and information.

*The Concept.* Our initial problem developing the corporate memory is conceptual. First, we must organize, meaningfully structure, and link for cross reference, massive amounts of DSAM knowledge and information; i.e., the body of DSAM knowledge, in a distributed defense acquisition corporate memory. Second, we must do this in a way that facilitates:

—Retrieval of relevant DSAM job knowledge needed to educate "knowing" DSAM professionals for specific jobs and tasks, and to provide other knowledge as needed for performance of new jobs and tasks

—Timely retrieval of "right" DSAM information to answer immmediate management questions and effectively complete tasks at hand

—Effective communication among "knowing" professionals and with others, in more productive management of defense acquisitions.

This concept applies whether the knowledge and information in the corporate memory is stored in thousands of human and manual repositories loosely connected only by mail and telephone, in many huge on-line data bases, or on numerous CD-ROM-discs.

Useful items of the body of DSAM knowledge and information are distributed widely throughout the acquisition community in a variety of repositories and data bases, and in memories of experts. Communications connectivity among and within these distributed repositories, data bases and expertise elements is essential. The DSAM professionals must be able to move within and among these elements of the corporate memory to find specific topics, cross-references, expanded definitions, visual interpretations and graphical illustrations in their search for job-relevant knowledge and task-relevant information. Practicality demands that communication with the corporate memory, and within its elements, must be based on the same language and concepts that DSAM professionals use to think, classify, search, act and communicate in managing defense acquisitions.

Structuring and organizing the whole body of DSAM knowledge and information for effective connectivity among these distributed elements must meet two requirements. First, the structuring and organizing of all elements must be based on a truly common DSAM language (common terms, definitions and acronyms) and on concepts and standards common among DSAM professionals. Second, the computer-based elements must use the technical computer and communications standards and protocols required for connectivity among computer-based data bases. The second requirement is a technical problem that is well recognized today. The first needs explanation, emphasis and early action.

*Common DSAM Language.* A truly common DSAM language is required, for interconnectivity among elements of the distributed acquisition corporate memory, and for DSAM professionals to communicate effectively with elements of the corporate memory and with other professionals. Definitions and understandings of DSAM terms and concepts must be common among all "knowing" DSAM professionals to enable them to identify and assemble, and then classify and store useful DSAM knowledge and information in the distributed corporate memory elements; search this widely distributed body of DSAM knowledge for job knowledge and for information relevant to tasks at hand; retrieve relevant DSAM knowledge and "right" DSAM information, and use them knowledgeably to complete each management task; and communicate unambiguously with others concerning management of defense acquisitions.

*Concept Evolution.* This concept of a defense acquisition corporate memory stems from my planning for, and early development of a prototype organizational corporate memory. A review of this development will help understand requirements of, urgent need for, and practicality of a well-interconnected, distributed defense acquisition corporate memory of the immense body of useful DSAM knowledge and information.

I first recognized the need for something like a card catalog of documented defense program management knowledge in 1972 at the Defense Systems Management School (now College), when I had to develop a new practical course, Program Management Office Organization and Man-

agement. Its study materials had to be germane for middle-manager students from the four military services. Later, as Deputy Director, Program Management Department, trying to assure study materials for all courses in the Program Management Course (PMC) were current, relevant and the best available, I discovered the extent of this need by professionals throughout the defense acquisition management community. They, too, were seeking relevant job knowledge and "right" information for tasks at hand.

During 1976-78, I directed several PMC students in Individual Study Projects: to develop a prototype DSAM taxonomy[12] as a common DOD structure for organizing the body of DSAM knowledge; and to use a prototype taxonomy to inventory and index DSAM documents to demonstrate its usefulness in quickly locating particular DSAM information.[13]

I saw a comprehensive DSAM taxonomy as prerequisite to significant improvement in quality and relevance of PMC study materials. More far-reaching, the taxonomy would enable the College to significantly improve its analyses of program management issues and curriculums and, thus, improve performance of its education and research missions, as well as perform much more effectively its third mission, "Assemble and disseminate new information concerning new methods and practices in program/project management."[14]

*Prototype Planning.* As Associate and Acting Dean, Department of Research and Information, I expanded this endeavor. We received authorization in January 1980 for DSMC to begin using the INFOCEN facility at the ASD Computer Center, Wright-Patterson Air Force Base, Ohio, for evolutionary development of a prototype on-line DSMC Corporate Memory data base. Additional DSMC personnel required to enter data, maintain and operate the DSMC data base were authorized for Fiscal 1981.

Meanwhile, I worked with INFOCEN to design the data banks needed first in evolutionary development of the Corporate Memory:

—DSAM Documents, to store bibliographic data for new Multinational and Offical DSAM Documents Repositories being assembled in the DSMC Information Center, and all future DSAM document repositories.

—DSAM Dictionary, for use initially in developing a comprehensive unambiguous DSAM Taxonomy, then to be expanded into an operational on-line glossary of authenticated DSAM terms, definitions and acronyms, to promote development of a truly common DSAM language.

—DSAM Organizations, for names, addresses, and contact points of organizations involved in defense acquisition, for use initially in field testing and improving the DSAM Taxonomy, then to aid DSMC communication with other sources of DSAM knowledge and information.

I began expanding the 1978 prototype DSAM Taxonomy and planned, when the DSAM Organizations data bank became operational, to distribute the Taxonomy for comment to improve its usefulness to DSAM professionals throughout the defense acquisition community for organizing, classifying and indexing the body of DSAM knowledge. We would use the comprehensive field-tested DSAM Taxonomy in the data collection, classification, storage, search and retrieval operations of the DSMC Corporate Memory. All data banks in the Corporate Memory data base would be indexed by the same Taxonomy, enabling simultaneous search of the whole memory by any taxonomic DSAM subject, and near simultaneous retrieval (from all data banks) of related knowledge and information relevant to a task at hand—in acquisition education or research, or in managing a program.

I began initial planning for the phased addition of other data banks (e.g., DSAM Expertise and On-going DSAM Research) in continuing evolutionary development of the Corporate Memory as resources and other development support would permit. As each prototype data bank became operational, DSMC faculty could use remote terminals to access it for new information to improve DSMC performance of its DSAM education and research missions. If resources were provided to expand DSMC performance of its third mission, acquisition policy-makers, managers, educators and researchers throughout DOD could access the operational Corporate Memory for information useful in their respective policy-making, oversight, program management and educational tasks, and research projects.

I hoped this prototype Corporate Memory would be a model for other organizations involved in defense systems acquisition, to develop similar corporate memory data bases in their respective areas of acquisition management. I envisioned that, interconnected by yet unknown means, the network of defense acquisition data bases could evolve into a practical defense acquisition corporate memory, which all DSAM professionals could access, as needed, for relevant DSAM job knowledge and "right" DSAM information for new tasks at hand.

In 1981, however, the change of administrations and of key policy-makers on the DSMC Policy Guidance Council and in DSMC, coupled with growing pressure to expand DSMC student capacity and throughput, diverted the DSMC manpower spaces approved for operating the Corporate Memory to higher priority expansion of the DSMC education program. Development of the prototype DSMC Corporate Memory in INFOCEN was cancelled.

Work completed on the prototype helped me test and refine initial concepts for improving access to the body of DSAM knowledge. Through a new focus on productivity, I have developed new concepts and identified key requirements for structuring, assembling, classifying, indexing, and storing the body of DSAM knowledge which is in the defense acquisition corporate memory scattered throughout the acquisition community. I have continued research on DSAM knowledge systems needed to aid selective timely access to the knowledge and information in this corporate memory.

## Knowledge Systems Concept

As defense acquisition organizations become more information-based, the

need for a comprehensive, thoroughly interconnected, defense acquisition corporate memory will increase. So will the need for timely selective access to the immense body of DSAM knowledge and information stored in widely distributed data banks[15] of the corporate memory.

The DSAM professionals throughout the defense acquisition community need current relevant DSAM knowledge and timely "right" DSAM information to increase productivity. This could come from many different sources in government, industry, business and academia—existing DSAM documents, available DSAM expertise, and new DSAM research—and be stored in distributed data banks. We need practical aids, DSAM knowledge systems, to interconnect these manual and computer-based data banks and provide professionals selective timely access to critical knowledge and information.

Serious concern about the dangers of transition after the election underlines the general need for corporate memory to help in the transition to new policy-makers. A 1988 report, prepared by a commission headed by former secretaries of state Cyrus R. Vance and William P. Rodgers, and reported in the *Washington Post* on Aug. 1, 1988, warns about vulnerability to disaster when a new administration confronts problems of transition. Although the report concerns transition in the Department of State, many of its lessons-learned and recommendations are applicable to turnovers of policy-makers at all levels in defense acquisition, particularly their recommendation that "All documents necessary to the implementation of ongoing policy or required as background for future decisions should be reproduced and saved."[16]

Such document reproduction and saving is not sufficient, however. There is an urgent need, in defense acquisition, for DSAM knowledge systems to interconnect the distributed corporate memory data banks so they serve continuously—not only through transition of administrations, but through all turnovers of key policy-makers in administrations and the Congress—to aid steady progress in long-term improvement in acquisition.

Long-term acquisition improvement initiatives and agendas succumb to neglect when new policy-makers, finding no good corporate memory to check their prior experience based perceptions against, let productive initiatives die and start different new initiatives based on perceptions developed in previous jobs. Acquisition policy-maker turnover has been high since the Defense Department was created. Many acquisition improvement initiatives have died before engendering successful long-term improvements.[17] We will fail to institutionalize crucial long-term initiatives to improve DSAM processes and increase productivity until we start using DSAM knowledge systems to develop an interconnected corporate memory that can help new key policy-makers in administrations and the Congress confront the hazards of transition.

In addition, all DSAM professionals (who can, for better or worse, influence acquisition programs) urgently need the corporate memory and knowledge systems to aid in daily tasks, and in ongoing communications among themselves and with other people who can influence defense acquisition. The distributed DSAM data banks comprising the defense acquisition corporate memory, when interconnected by DSAM knowledge systems, would provide timely access to relevant DSAM job knowledge and "right" DSAM information. Data banks could include the following.

—Official documents including laws, policies, directives and regulations

—Separate guide documents including how-to alternatives which DSAM professionals can consider and tailor in implementing official what-to policies and directives

—DSAM research reports and documentation of lessons learned

—DSAM expertise, organizational and individual, available for consultation

—Validated critical acquisition management issues needing research

—Status of ongoing DSAM research projects to increase acquisition managment knowledge

—Organizations and contracts supporting defense acquisition

—An integrated DOD Acquisition Strategy

—Sequential reports of periodic Presidential Blue Ribbon Commissions on Defense Management (every 4 years).

Together, such distributed data bases (interconnected manually and electronically by DSAM knowledge systems) would:

—Support more effective transitions between administrations, and long-term continuation of sound DOD acquisition improvement initiatives until they are institutionalized

—Enable DSAM professionals to use existing relevant DSAM knowledge and information more productively

—Support more cost-effective generation and faster dissemination of relevant new DSAM knowledge, particulary if DOD would act to integrate the DSAM Research and DSAM Information Assembly and Dissemination processes.

## Closing Thoughts

Assuring adequate national defense in a changing, uncertain world is one of the crucial challenges facing the new administration. The DSAM processes are not as productive as they must be to assure this in the current environment. Considering the potentially fatal consequences of inadequate defense and the present political environment, I see no good alternative to increasing productivity in defense acquistion.

Acquisition productivity can be increased substantially through general long-term DOD initiatives on three fronts. One, acquisition professionals must develop and use DSAM processes that are more integrated. Another, they must "manage" constructive change in their defense acquisition environments, and motivate development of a management culture that is more conducive to honest, ethical government-industry team work.

Third, they must develop DSAM knowledge systems based on a common DSAM language and use them to interconnect widely distributed data banks of the defense acquisition management corporate memory. These knowledge systems and the corporate memory will aid timely selective access to the immense body of DSAM knowledge, increase the flow of useful DSAM information and improve management communciations throughout the defense acquisition community, making success in the other two initiatives possible.

Increasing productivity requires a new focus on elements of productivity in organizations. This article has focused on DSAM professionals and on the intangible job- and task-related resource inputs to DSAM processes—DSAM knowledge and DSAM information. Using them effectively requires development of new concepts for understanding and using these resources as input to DSAM processes to increase productivity. I have developed some new concepts required to define and design actions in support of the third initiative. These concepts will be refined and new ones developed as we learn better how to use knowledge and information as resources in acquisition management.

The general initiatives provide a framework for increasing productivity. However, they must be effected on all three fronts by specific evolutionary actions that contribute to achievement of the productivity—increase objectives of the initiatives.

I will, in another article, propose immediate actions to begin widespread evolutionary implementation of the third initiative, and complementary DOD actions implementing the first two general initiatives that my research indicates DOD should also start immediately. The complementary DOD actions include developing an integrated DOD Acquisition Strategy; integrating the DSAM Research and DSAM Information Assembly and Dissemination processes; and instituting periodic Presidential Blue Ribbon Commissions on Defense Management every 4 years, in time to provide defense management status and recommendations to aid transition for each new administration.

## Endnotes

1. The acronym *DSAM* (Defense Systems Acquisition Management) is used in this series to represent both the DSAM process and the body of DSAM knowledge used in managing the process. Both encompass process concepts, functions and related information ranging from managing the acquisition or modernization of a defense system to overall management and support of all defense system acquisitions.

2. The term *DSAM professional*, as used in this article, includes any government, contractor, academic or other knowledge worker who uses DSAM knowledge and information professionally in his or her job in support of the defense systems acquisition process—for example, DSAM policymakers, program/project managers/directors and their staffs, support managers, congressional staffs and members of the Congress, educators, researchers, and DSAM information managers, including librarians who maintain documented DSAM knowledge and know other accessible sources of DSAM knowledge and information for ready access when needed by a professional.

3. Mosier, Andrew P., 1987. "Getting the Jump on DOD Productivity." *Program Manager: The Journal of the Defense Systems Management College* (hereafter referenced as *Program Manager)* 16 (July-August): pp. 24-26.

4. President's Blue Ribbon Commission on Defense Management, 1986. *A Quest for Excellence: Final Report to the President* (hereafter referenced as *Packard Commission Report).* Washington, D.C.: U.S. Government Printing Office, June, 115 pages. Chapters 1, 2, and 4 show why the defense acquisition environment and its present management culture is a crucial impediment to increasing productivity in defense acquisition.

5. Mosier, Andrew P., 1988, "Past Acquisition Improvements: Not Sufficient." *Program Manager* 17 (May-June) pp. 42-57.

6. *Packard Commission Report,* p. 43.

7. The term *"knowing" DSAM professinal,* includes all DSAM professionals who have learned the requisite knowledge and task skills to perform their jobs effectively (including new jobs to which they have been assigned or expect early assignment). The required DSAM knowledge must be an intrinsic part of the "knowing" DSAM professional in order to be an effective knowledge resource input to defense acquisition process. (Even apparent exceptions—automated direct inputs of DSAM knowledge—require a "knowing" professional to automate the input.)

8. Taft, W.H., IV, 1986. "Streamlining Has Begun to Pay Off." *Program Manager* 15 (March-April): 20.

9. Drucker, Peter, F., 1988. "The Coming of the New Organization." *Harvard Business Review* 66 (January-February): 45.

10. "The Three Faces of CD." *CD-ROM Review* (June 1988) pp. 12-13. See "GCN Spotlight: Optical Storage," *Government Computer News* (May 27, 1988) pp. 33-52, for descriptions of current and planned applications of optical storage technology in government agencies. See Feuche, Mike, "Ontologic Shows Vbase Object-oriented DBMS." *MIS Week,* (April 25, 1988) p. 38, for an example of 1988 emergence of commercial object-oriented DBMSs that integrate text, geometry and graphics, which other DBMSs cannot do.

11. Drucker, "The Coming of the New Organization," pp. 45-53.

12. Taxonomy: "The systematic distinguishing, ordering, and naming of type groups within a field." *Webster's 3rd New International Dictionary (Unabridged).*

13. Tateyama, Joseph Tadashi, Major, USA, 1977. "A Defense Systems Acquisition Management Taxonomy and Inventory of Official Acquisition Management Documents" ISP Study Project Report, PMC 77-1. DSMC. 128 pp. (Document Access Numbers: DTIC A044958, DLSIE 39970A). Although more studies were conducted, this is the last prototype

(Continued from page 23)

taxonomy and inventory completed for publication before the Individual Study Program was discontinued in PMC 78-1.

14. Department of Defense Directive 5160.55, "Defense Systems Management School," April 20, 1971.

15. The term *data banks* is used here in a generic sense for media that store DSAM knowledge and information in corporate memories and knowledge systems. They include physical document repositories in information centers, text and bibliographic files in on-line computer data bases, text and graphics on CD-ROM discs on inoptical-disc files of juke boxes, and even the human memory of professionals available for consultation.

16. Vance, Cyrus R., and Rodgers, William P., 1988. "Transferring Responsibility: The Dangers of Transition." Sponsored by the White Burkett Miller Center of Public Affairs, University of Virginia. Havemann, Judith. 1988, "Transition Hazards: The Bay of Pigs Lesson." *Washington Post*, August 1, p. A-11.

17. Mosier, Andrew P., 1988. "Past Acquisition Improvements: Not Sufficient." *Program Manager* 17 (May-June) pp. 47-49.

## IN MEMORIAM

In memory of Dr. Fred E. Waelchli who died March 6, 1989. Dr. Waelchli was a major contributor to the success of the Defense Systems Management College in his decade here as a professor. A memorial service was held March 10, 1989, at the Fort Belvoir Post Chapel. Anyone wishing information or desiring to donate to a memorial fund, please contact the College Business Management Department at (703) 664-4297.

designs through all NBC contamination survivability related activities needed for OSD review. Appropriate classified documents will need to be reviewed by your contractor.

*System Survivability.* All mission-essential parts of an NBC contamination survivable system must be NBC contamination survivable. You must ensure that the NBC contamination survivability of your system is not degraded by any Government Furnished Equipment (GFE) that is not survivable in an NBC contaminated environment. Whether the equipment is developmental or off-the-shelf, you need to ensure that the GFE you use meets your system's NBC contamination survivability criteria.

*Maintaining NBC Contamination Survivability.* Develop NBC contamination survivability maintenance and assurance plans to protect your system's program for adequately addressing NBC contamination survivability. Incorporate these plans into your Integrated Logistics Support Plan.

The impact of NBC contamination survivability problems can be reduced if your NBC Contamination Survivability Program Plan is accurate and if it is followed throughout the development and/or acquisition of your system. Assistance with NBC contamination survivability policy, technical, and programmatic matters is available from your military service staffs, the Army CRDEC, and DOD and Service data bases and information centers.

### Summary

The development and acquisition of sustainable, NBC contamination survivable, mission-essential systems is necessary to enable mission accomplishment on the NBC contaminated battlefield. When properly addressed early in the development and/or acquisition cycles, NBC contamination survivability costs are reasonable.

To develop or acquire an NBC contamination survivable system, develop an NBC Contamination Survivability Program Plan, incorporate NBC contamination survivability early, thoroughly and accurately document your rationale and decisions, and use your staff's and your contractor's NBC Contamination Survivability Managers. Ensure that NBC contamination survivability is planned for and maintained throughout the life cycle of your system.

Use the current technology and management assistance of the Department of Defense, military services, and contractors. Keep abreast of your program.

### Endnotes

1. LCDR R. Ross, USN, and Dr. C. Stuart Kelley, "A Program Manager's Guide to Producing Nuclear-Survivable Systems," *Program Manager*, November-December 1987.

2. DOD Instruction 4245.13, "Design and Acquisition of Nuclear, Biological, and Chemical (NBC) Contamination-Survivable Systems," June 15, 1987.

3. Ibid.

4. Ibid.

5. Ibid.

6. DOD Instruction 4245.4, "Acquisition of Nuclear-Survivable Systems," Sept. 2, 1983.

7. DOD Directive 5000.1, "Major System Acquisition," March 12, 1986.

8. DOD Instruction 5000.2, "Major System Acquisition Procedures," March 12, 1986.

9. DOD Directive 5000.3, "Test and Evaluation," March 12, 1986.

10. Army Regulation 70-71, "Nuclear, Biological and Chemical (NBC) Contamination Survivability of Army Materiel," April 1, 1984.

11. Draft Air Force Regulation 80-38, "The Air Force Systems Survivability Program," Nov. 25, 1987.

12. Draft SECNAV Instruction, "Design and Acquisition of Nuclear, Biological and Chemical (NBC) Contamination-Survivable Systems," undated.

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# PERSONAL AND CAREER COMMUNICATION

*James A. Graf*

An article in the March-April 1988 issue of *Program Manager*, "Greet That New Lieutenant! But That's Not All!" stressed that performance appraisal should not be an annual event but that, for best results, appraisal should be a series of events throughout the year.

I couldn't agree more! I have found a way to systematize communication between supervisor and subordinate, a method that has worked well for me for many years. This system, which I employ on a *quarterly* basis, provides an easy means for the supervisor to rank attributes against a specific set of job functions (Figure 1), provides comments pertaining to the individual's performance (Figure 2), and provides an evaluation of the individual's personal attributes (Figure 3). The job functions chosen for this process should nearly match those used for the official, annual performance appraisal.

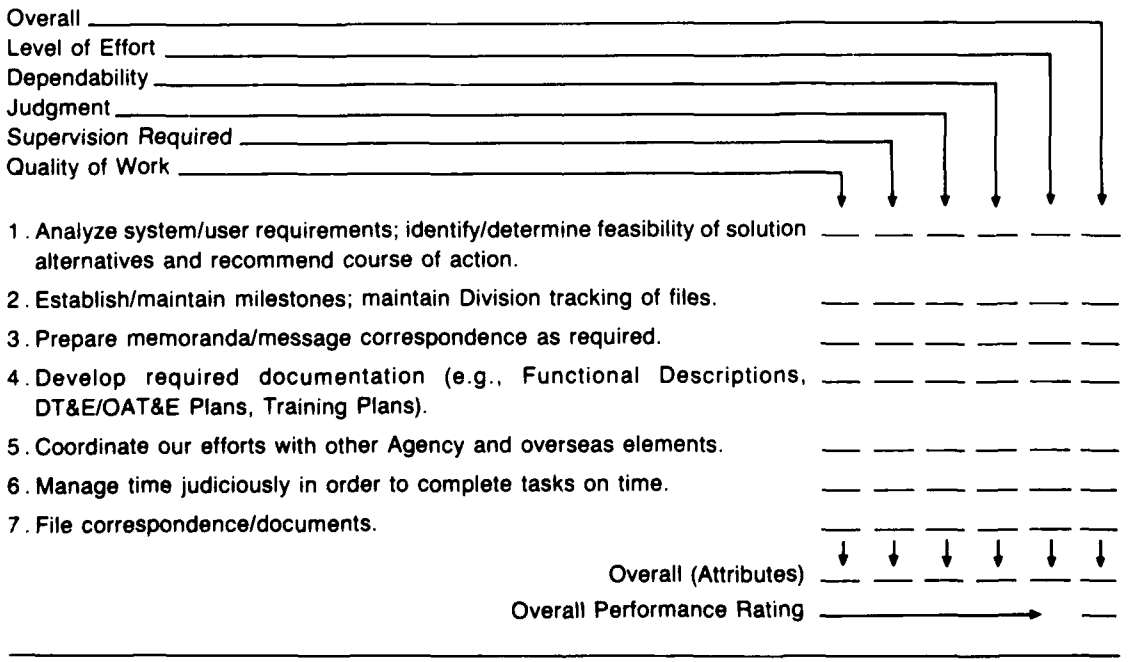
I make it clear that numbers and words used to "rank" the individual are strictly subjective. Simply because the evaluation is subjective, the system is easy to employ. As a supervisor, I'm relating to individuals how I "feel" about their performances in some regard.

New employees are counseled on this process and are made aware, especially of job functions and personal attributes, that are my expectations.

The first such report given to an employee provides a general feeling of accomplishment (or failing). For example, a rating of "90" is good while a rating of "40" isn't. The real benefit comes as time goes on and the individual can compare the current appraisal to previous reports and understand that performance is regarded as up, down, or steady.

It is necessary to consider the degree of difficulty of job assignments when considering this informal appraisal. For example, if the individual is given more challenging and difficult tasks, then at least initially lower marks might be expected.

***FIGURE 1. JOB FUNCTIONS***



The real kicker to the system, as I've implemented it, is that at the same time I give the individual my rating I give forms to indicate his/her opinion of *my* performance as a supervisor/leader!

I emphasize that I want the individual to be candid. After all, in response to a criticism of a specific action or my performance, I could present my best Perry Mason defense—but, I can't change the fact there was a perception.

I gain much insight from positive and negative feedback on my attributes as a manager (Figures 4, 5, and 6) and from the grid ranking (Figure 7). I know from experience it is possible to improve my effectiveness by paying attention to what they have to say.

The net result of this informal system of evaluation is that communication between supervisor and subordinate is enhanced. The system is not difficult and takes little time. If the system is used honestly by both parties, misunderstandings are minimized and supervisor and the individual become more efficient and effective and happy.

*Mr. Graf is a Deputy Division Chief in an Operations Group of the Department of Defense.*

### *FIGURE 2. INDIVIDUAL'S PERFORMANCE*

(Date)

Overall Comments:

I'd summarize your most important attributes as "qualified" and "dependable." I've been able to back way off on your projects and just trust that they would be done, on time and as best they could be done. That I'm able to rely totally on you counts for a lot and you are to be commended.

Once again, level of effort is exceptional. You do whatever is necessary, whenever it is necessary. Extra hours when we're in a "crunch" situation indicate your dedication and are very much appreciated.

I remind you to interrupt me anytime you have a question. You show good judgment in thinking things out clearly on your own rather than to come to me right away. But I think there are times when it would be more productive to bounce ideas around for a little while so that you can reach the right conclusions maybe a little quicker and with less heartburn. So don't hesitate to interrupt—I might be able to help, and that's why I'm here.

### *FIGURE 3. ADDITIONAL ATTRIBUTES*

Contributes to "team" environment ..... ——

Communicates verbally ..... ——

Communicates in writing ..... ——

Makes convictions clear ..... ——

Level of effort ..... ——

Temper (patience) ..... ——

Humor (purposeful) ..... ——

Willingness to learn (positive approach to constructive criticism) ..... ——

Initiative (figure out what needs to be done on your own) ..... ——

Organization ..... ——

Neatness (finished products ready to go) ..... ——

## *FIGURE 4. MANAGER'S ATTRIBUTES*

(Date)

Every quarter, I give you a subjective evaluation to indicate how I think you are doing in specific functions, ranked by various attributes for each. To increase our communications and hopefully improve my own worth, I would like for you to give me a subjective evaluation of what you think of me as a supervisor/leader. Use a 1-100 scale.

I've also provided space for narrative comments (positive or negative). Please be candid in your observations; only in this way can I either have my positive attributes reinforced or recognize and improve upon any attributes that you perceive as negative.

You should keep in mind that this evaluation is subjective. If you rank me as less than satisfactory in any area or make negative remarks, I can dispute your judgment but I can't change the fact that I am perceived in whatever way. I hasten to remind you, though, that reinforcement of positive attributes is also very important.

Jim

## *FIGURE 5. MANAGER'S ATTRIBUTES (CONT'D)*

Overall effectiveness as supervisor _____

Reliability _____

Clarity of guidance _____

Completeness of effort _____

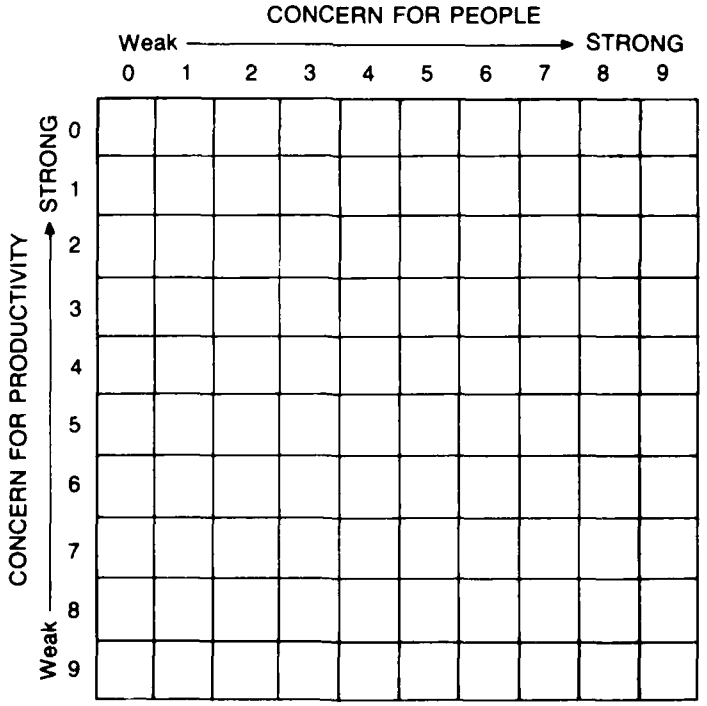
| | | | | |
|---|---|---|---|---|
| 1. As required, participates in analysis of system/user requirements, identification of solution alternatives and course of action. | ___ | ___ | ___ | ___ |
| 2. Participates in establishing/tracking milestones. | ___ | ___ | ___ | ___ |
| 3. As required, gives guidance or direction concerning preparation of memos and messages. | ___ | ___ | ___ | ___ |
| 4. As required, gives guidance or direction concerning preparation of required documentation. | ___ | ___ | ___ | ___ |
| 5. As required, gives guidance or direction concerning coordination or our efforts with Agency or overseas elements. | ___ | ___ | ___ | ___ |
| 6. Manages own time efficiently; gives good direction concerning time management. | ___ | ___ | ___ | ___ |

## *FIGURE 6. OTHER ATTRIBUTES AS MANAGER/SUPERVISOR*

Creates a "team" environment ____
Establishes clear goals ____
Provides direction/leadership ____
Communicates verbally ____
Communicates in writing ____
Makes clear decisions ____
Makes convictions clear ____
Temper (patience) ____
Humor (purposeful) ____
Level of effort (drives self and others) ____

## *FIGURE 7. GRID RANKING*

Shade in one block that best represents where I stand, in your opinion, with regard to people vs. productivity concerns:



# LETTERS TO THE EDITOR

The article "Making Smart Logistics Managers" in the November-December '88 issue of *Program Manager* adequately states "how" an acquisition logistics manager (LM) should be educated. More important is the "why" of educating an LM to a greater degree than this article's reason; i.e., "to achieve a higher level of readiness...." This is a vacuous phrase, typical of integrated logistics support (ILS) justification for weapon systems. It was always an insufficient rationale; it is even more so now. This is because tighter resources correlate perfectly in an RDT&E program's trade-off arena. This "arena" is where the program manager (PM) is asking for increase in objectivity from his or her team to prioritize among cost, schedule, performance (state-of-the-art capability), and supportability (reliability and maintainability, availability). The DOD directives instruct a program manager to consider each of these four criteria equally. This requires dedicated, *equally* influential advocates for each four criteria, and *this* is the rationale for an educated LM. To advocate cost-effective support, an LM must possess expertise, rank/grade, and influence relative to subject-matter peers: financial manager, engineer, contracts specialist.

When (not if) the program manager asks what will be the effect of a funding cut in early integrated logistics support analysis or in out-year operation and support funds, the LM must be able to say more than "readiness will be adversely affected," or similar vagaries. An LM can best answer using various logistics requirements funding plans. Such a plan tracks ILS elements and fund resources required to support each facet of the system throughout its life. Since ILS elements are very interrelated, such a plan can reflect how changes in logistics funding of ILS elements will change the nature of support to each facet of the system. If maintained by the LM, then the constant queries by the program manager and financial manager within the trade-off arena regarding proposed cuts can be answered quickly and tangibly with this credible analysis tool.

Other opportunities for providing the PM with credible decision-making information include optimizing the savings attributed to the new computer-aided acquisition and logistics support (CALS) initiatives. In addition to manipulating the processes which will generate technical documentation in a common, digitized form, the logistics manager must learn to force greater integration of reliability and maintainability design into all elements of systems engineering via CALS. Well-considered, early, LM guidance can avoid an unanticipated drain on an operational command's discretionary support funds in the new areas of nondevelopmental items. As encouraged by recent Office of the Secretary of Defense policy, proliferation of "rapid acquisition" procurement strategies, which are expeditious in meeting immediate field and fleet operational needs, rarely consider eventual costs of ownership or inevitable extension of service life. An educated LM can balance the program manager's desire to act quickly and infer support waivers with the need to prepare from the first for life-cycle support at a reasonable cost.

It may be true that the LM's concerns involve 50 percent or more of a weapon system's eventual cost or that the vast majority of support costs are determined (locked in) well before operation and support costs properly begin. However, unless an LM can show a tangible return on investment for up-front logistics analysis (LSA, MANPRINT, Readiness-based Sparing, etc.) or can bring organizational pressure to bear (Milestone I-IV audits and decision forums), then the program manager has little incentive to fund such analysis. The analysis that *is* funded will require an educated tailoring or the LM can expect little support from the program manager thereafter. Further, the program manager may enjoy greater discretion in the future to act but with a greater constraint on funds. The pressure to not fully fund out-year support in favor of more immediate progress during the program manager's tenure, despite the LM's well-documented argument of life-cycle cost ineffectiveness, will be great. An LM, with an educated understanding of the policies which provide a supportability check and balance, and with the expertise to develop the statistical analysis which supports those policies, can best serve the program by being prepared at all times to place these facts and their consequences on the trade-off table.

Charles A. Borsch
OPNAV-461D
PMC graduate, class of 85-2

We welcome your letters. Send them to *Program Manager*, Defense Systems Management College, DRI-P, Fort Belvoir, VA, 22060-5426. The editors reserve the right to edit letters for publication. All letters *must* be signed.

# FISCAL YEAR 1989 DEFENSE APPROPRIATIONS AND AUTHORIZATION ACTS

# A SYNOPSIS

*Wilbur D. Jones, Jr.*

Breaking with years of tradition, the 100th Congress passed the Defense Appropriations Act and Defense Authorization Act before the end of the fiscal year. Usually, the two Acts are passed well after October 1st annually and often in the form of a Continuing Resolution.

The two Acts contain 41 wide-ranging provisions dealing with defense acquisition. None are earthshaking, but each eventually will affect all defense acquisition managers in some way. Most provisions are contained in the Authorization Act Title VIII, Acquisition Policy and Management. Most provisions amend Title 10, U.S. Code.

The Acts passed by the Congress on September 28, 1988, and signed by the President on September 30th, were:

> HR 4781, Making Appropriations for the Department of Defense (Defense Appropriations Act), and
>
> HR 4481, Defense Savings Act of 1988 (Defense Authorization Act).

The Conference Reports are identified as follows:

> House of Representatives Report 100-1002 (Appropriations Act), and
>
> House of Representatives Report 100-989 (Authorization Act).

Additionally, HR 4781 included provisions for enacting HR 4481 (Title X. Section 10001) had 4481 not been passed earlier or simultaneously.

This paper is intended to highlight the provisions and summarize their principal points. For details, the reader should refer to the legislation and conference reports.

> For ease of identification, the abbreviations **App** for Appropriations Act, and **Auth** for Authorization Act will be used in reference to each Act. The provisions are sorted into three categories: those primarily affecting top management and organization, those affecting acquisition managers immediately or in the near-term, and those which are informational or whose total impact is pending.

## Primarily Affecting Top Management and Organization

*Authority to Establish Position of Assistant Secretary of Defense for Intelligence.* Auth. Title VII, Section 701.

Establishes Assistant Secretary of Defense for Intelligence, and establishes position of ASD for Command, Control, and Communications (formerly ASD (C31)), and describes general scope of responsibilities.

*Designation in each Military Department of Assistant Secretary with Responsibility for Financial Management.* Auth. Title VII, Section 702.

Establishes positions of Assistant Secretary for Financial Management in each military department, and describes general scope of responsibilities.

*Integrated Financing Policy.* Auth. Title VIII, Section 801.

(a) Requires SECDEF to develop and maintain a plan ensuring DOD policies are structured to meet long-term DOD needs for industrial resources and technology innovation, including (1) progress payments, (2) return on contractor investment, and (3) allocation of contract risk. (b) Requires SECDEF to appoint 5 members of an Advisory Committee on Study Methodology to recommend financial analysis methodology for any return on investment study.

*Delegation of Authority to Approve Certain Contract Justifications.* Auth. Title VIII, Section 803.

Permits the USD(A) to delegate approval authority for contract awards in excess of $10 million using non-competitive procedures to a senior official within each DOD applicable element. (This provision extends coverage to defense agencies which was not present in Title 10.)

*Department of Defense Advisory Panel on Government-Industry Relations.* Auth. Title VIII, Section 808.

Requires SECDEF to establish advisory panel on government-industry relations within 30 days. Panel is to study and recommend ways to enhance cooperation between DOD and industry including (1) debarment and suspension of contractors, (2) contractor self-governing oversight programs, (3) alternative dispute resolution procedures, and (4) desirability of establishing permanent panel. Requires SECDEF to submit report on advisory panel to the Congress.

*Report on Simplification and Streamlining of Acquisition Procedures.* Auth. Title VIII, Section 809.

Requires USD(A) to submit report to the Congress on current programs to simplify procedures governing the acquisition process, including a timetable to effectuate reform measures based on certain lessons learned, and timetable for completing an assessment of program results.

*Product Evaluation.* Auth. Title VIII, Section 842.

Requires the SECDEF to establish a product evaluation activity (user point of contact, no separate office) for

demonstrating and evaluating promising items of equipment developed by private industry.

*Improvement in Defense Research and Procurement Liaison with Israel.* Auth. Title X, Section 1006.

Requires SECDEF to assign to duty in Israel person(s) to serve as primary liaison between the procurement and R&D activities of the United States-Israel armed forces.

### Affecting Acquisition Managers Immediately Or in Near-Term

*Reprogramming Procedures.* App. Title III.

The conferees reaffirmed the status of "special interest" defense programs and agreed DOD should consult with the appropriations committees before issuing Form 1414, "Base for Reprogramming," so there is common agreement on items of special interest. Reprogramming into or out of these lines shall be subject to prior reprogramming actions, and DOD shall not transfer funds from special interest items through the below-threshold process.

*Reverse Engineering.* App. Title III.

The conferees commend DOD on conduct of reverse engineering program and request statistics on future activity and submit annual status reports to the appropriations committees.

*Consulting Services.* App. Title VIII, Section 8137.

Reduced consulting services by $150 million. The SECDEF shall report to appropriations committees by March 1, 1989, how this reduction was allocated.

*Acquisition Personnel.* App. Title VIII.

The conferees agreed with DOD regarding "Bid to Performance" use of performance specifications, which would save time and money in acquisition programs by reducing specifications and enabling industry to use its initiative. This allows DOD to reduce number of military and civilian acquisition personnel.

*Conflicts of Interest.* App. Title VIII, Section 8141.

Administrator of Office of Federal Procurement Policy (OFPP) shall issue policy (within 90 days) setting forth conflict of interest standards for consultants and procedures to promote compliance. The policy shall apply to (1) advisory and assistance services, (2) services related to support of preparation of bids and proposals for federal contracts, and (3) other necessary measures to identify and evaluate potential for conflicts of interest. Intelligence activities may be exempt.

*Management of Certain Defense Procurement Programs.* Auth. Title I, Section 117.

(a) The SECDEF shall submit to the Congress with budget a statement regarding effect of stretchouts for major programs if (1) the final scheduled procurement year is more than 2 years later than the final year stated in most recent Selected Acquisition Report (SAR), (2) the proposed procurement quantity for that fiscal year is less than 90 percent as that proposed for same fiscal year in most recent SAR, (3) applies to programs with proposed procurement rate of 6 or more units per year, (4) the SECDEF shall identify each above program and explain why the lower procurement rate, (5) foregoing shall include estimate of projected increase in unit cost and total program cost, (6) By March 15, 1989, SECDEF shall submit to armed services committees report on feasibility of establishing maximum production rates by December 1990 for certain major programs.

*Enhancement of Capability to Combat Fraud, Waste and Abuse.* Auth. Title III, Section 304.

The SECDEF shall, by September 30, 1989, increase number of audit and support personnel assigned to Office of Defense Inspector General from 550 to not less than 657, and do same for Defense Contract Audit Agency from 6,439 to not less than 7,007.

*Requirements for Certain Circular A-76 Procedures.* Auth Title III, Section 331.

Requires DOD to include retirement system costs when making comparison under OMB Circular A-76 (or successor) for determining cost of performing commercial activities.

*Evaluation of Contracts for Professional and Technical Services.* Auth. Title VIII, Section 804.

Requires SECDEF to establish criteria that proposals for professional and technical services are evaluated on a basis which does not encourage contractors to propose mandatory uncompensated overtime for professional and technical employees.

*Procurement of Critical Spare Parts.* Auth. Title VIII, Section 805.

Requires agency head, when purchasing critical spare or repair parts, to use all appropriate quality and qualifications requirements as may be specified and made available to potential offerors.

*Incentives for Innovation.* Auth. Title VIII, Section 806.

Requires DOD, in considering responses to proposals, to evaluate items developed exclusively at private expense by analyzing the total value of incorporating such items in the system.

*Regulations on Use of Fixed Development Contracts.* Auth. Title VIII, Section 807.

Requires SECDEF to prescribe guidelines limiting the use of fixed price contracts for development programs. The conferees expect the revised regulations to provide greater detail regarding DOD policy of discouraging fixed price development contracts.

*Source for Procurement of Certain Valves and Machines Tools.* Auth. Title VIII, Section 822.

Prohibits DOD from buying powered and non-powered valves manufactured outside the United States and certain machine tools manufactured outside the United States and Canada. Requires SECDEF to submit report by February 1, 1989, on the costs and effects of "Buy American" restrictions. (The conferees believe this represents a reassessment by the Congress of "Buy American" restrictions in procurement of defense equipment.)

*Additional Prohibitions on Persons Convicted of Felonies Related to Defense Contracts.* Auth. Title VIII, Section 831.

Establishes a minimum of 5 years as period a person convicted of felony in connection with DOD contract must wait before again working in a management or supervisory capacity on any defense contract, or serving on board of directors of defense contractor. Waivers may be granted by SECDEF.

*Limitation on Allowability of Costs of Contractors Incurred in Certain Proceedings.* Auth. Title VIII, Section 832.

Establishes limit on legal fees ($75 per hour) and related expenses as allowable costs in any proceeding relating to a violation of or failure to comply with any law or regulation which results in a conviction, civil judgment, finding of liability, etc., or decision to debar or suspend. Costs shall be unallowable if finding is based on willful violation or failure to comply. The SECDEF required to issue regulations.

*Equal Employment Opportunities Relating to an Army Contract.* Auth. Title VIII, Section 835.

Prohibits SECDEF from awarding contract to be performed overseas to any contractor that discriminates on the basis of race, color, religion, or national origin in its employment practices. Specifically prohibits performance of one particular Army contract unless these conditions are met.

*Procurement Technical Assistance Cooperative Agreement Program.* Auth. Title VIII, Section 841.

Requires DOD to (1) provide procurement technical assistance programs relating to export of defense-related products and services; (2) increase the maximum amount of DOD assistance to $300,000 on a State-wide basis, and that provides an additional year for DOD to obligate the $500,000 made available last year for programs related to Indian tribal organizations.

*Contract Goal for Small and Disadvantaged Businesses in Printing-Related Services.* Auth. VIII, Section 843.

Authorizes Public Printer, in DOD contracts for printing, binding and related services, to contract with small and disadvantaged business to meet previously established small business activity goals, and established test program for DOD contracts in FYs 1989-90.

*Extension of Contract Goal for Small Disadvantaged Businesses.* Auth. Title VIII, Section 844.

Extends by 1 year the program requiring a 3-year, 5 percent DOD contracting goal for small disadvantaged businesses established in 1987 Authorization Act.

*Deadline for Certain Small Business Regulations.* Auth. Title VIII, Section 845.

Requires DOD to issue certain small business regulations required by 1987 Authorization Act.

*Safeguarding Military Whistleblowers.* Auth. Title VIII, Section 846.

Protects lawful communications by military personnel to member of the Congress or defense Inspector General, prohibits retaliatory actions, requires DOD IG investigation of certain allegations and provides statutory guidance in reviewing such reprisals.

*Authority of Military Departments to Loan and Borrow from Foreign Countries Materials, Supplies and Equipment for Research and Development Purposes.* Auth. Title X, Section 1003.

Clarifies authority of SECDEF and Secretaries of military departments to loan and accept material for limited cooperative R&D projects with foreign countries, and limits the countries with whom transactions could be made to those in NATO and "major non-NATO allies."

## Informational, Or Whose Total Ultimate Impact Is Pending

*Allowability of Costs to Promote the Export of Defense Products* App. Title VII, Section 8105, and Auth, Title VIII, Section 826.

Section 8105 requires SECDEF establish regulations to provide that costs to promote the export of products of the U.S. defense industry, including costs of exhibiting and demonstrating such products, shall be allowable to the extent that such costs are allocable, reasonable and not otherwise unallowable; are determined by SECDEF likely to result in future cost advantages to the United States; and, for business segments which allocate to DOD contracts $2.5 million or more of such costs in any fiscal year, are not in excess of the amount equal to 110 percent of such costs incurred in previous fiscal year. The SECDEF shall issue regulations within 90 days of enactment of this Act.

Section 826 allows foreign selling costs if they are likely to result in future cost advantages to the United States.

*Allowable Costs with Respect to Certain Service Contracts Performed Overseas.* Auth. Title III, Section 322.

Allows costs of severance pay paid by a contractor to foreign nationals employed overseas under service contracts performed outside United States which meet certain conditions.

*Maintenance and Improvement of the Defense Industrial Base.* Auth. Title VIII, Section 821.

Requires SECDEF, through USD(A), to provide centralized guidance, analysis, planning and direction on matters relating to the maintenance, expansion and readiness of the U.S. defense industrial base. Authorizes USD(A) to establish a Defense Industrial Base Office to develop policies for programs to improve the industrial base.

*Critical Technologies Plan.* Auth. Title VIII, Section 823.

Requires USD(A), in consultation with the Assistant Secretary of Energy for Defense Programs, to submit a plan for developing the 20 technologies most essential to ensuring long-term U.S. weapon superiority.

*Defense Memoranda of Understanding.* Auth. Title VIII, Section 824.

Requires SECDEF to consult with Secretary of Commerce in negotiation and renegotiation of memoranda of understanding between DOD and one or more foreign countries relating to defense trade, cooperation on defense research, or production of defense equipment.

*DOD Offset Policy.* Auth. Title VIII, Section 825.

Requires the President to establish an offset policy for defense contractual arrangements with foreign countries, and restricts the United States from entering into any agreement with a foreign country requiring transfer of U.S. technology subject to an offset arrangement, if the agreement implementation would adversely affect the U.S. defense industrial base.

*Air Travel Expenses of Defense Contractors.* Auth. Title VIII, Section 833.

Authorizes General Services Administration to negotiate with commercial airlines about possibility of contractor personnel flying at government rates when traveling in performance of DOD contract. Contractor costs incurred in excess of negotiated rates would be unallowable.

*Standards for Contractor Inventory Accounting Systems.* Auth. Title VIII, Section 834.

Requires SECDEF to establish standards of inventory accounting systems for defense contractors including certification and enforcement mechanisms.

*Acquisition and Cross-Servicing Agreements with Allied Countries.* Auth. Title X, Section 1001.

Raises the ceiling from $100 million to $150 million on acquisitions by the United States as authorized by the NATO Mutual Support Act of 1979.

*Authority to Waive Surcharge Sales to NATO.* Auth. Title X, Section 1002.

Authorizes SECDEF to waive the administrative surcharge for sales from foreign military sales channels to the NATO Maintenance and Supply Agency.

*NATO and Non-NATO Cooperative Research and Development.* Auth. Title X, Item of Special Interest.

Directs SECDEF to identify in future budget requests funding for cooperative R&D efforts ($200.598 million) funded in 1986 and 1987 Authorization Acts.

*Mr. Jones, a Professor of systems acquisition management in the Policy and Organization Management Department, DSMC, served in the Pentagon as speech writer for the Under Secretary of Defense (Acquisition).*

# AMC CONFERENCE AT ABERDEEN

The U.S. Army Test and Evaluation Command and the U.S. Army Materiel Systems Analysis Activity were hosts for the eighth Army Materiel Command Test and Evaluation Managers Conference at Aberdeen Proving Ground, Md., the past January. Maj. Gen. George H. Akin, commander of TECOM and APG, presided.

Walter W. Hollis, Deputy Under Secretary of the Army (Operations Research), discussed Total Quality Management.

In 1985, the AMC commander established T&E managers to supervise T&E activities within respective commands. This entailed forming test integration working groups, preparing and approving T&E master plans, and providing input to the Army-wide T&E data base.

The T&E managers are a link between the materiel development and T&E communities. They are knowledgeable people at MSCs interacting directly with personnel to resolve difficulties before they become major problems. These managers have become the *de facto* forum for developing Army T&E policy. Evidence of this is the quality regulatory guidance documents emerging at the Department of the Army level.

Bill Wahlheim, T&E manager, U.S. Army Missile Command, said "We (T&E managers) are as different as the commodities we manage. However, we are working together and communicating to make a difference. Communication is, by far, the greatest benefit we have achieved. It has led to significant contributions to the overall T&E process and to the organizations involved."

# SURVEY RESEARCH AND FEEDBACK

Organizational Development requires a method to assess on a continual basis the current state of the organization. Survey Research and Feedback offers a method of not only assessing the organization but a method to involve its members in developing and implementing solutions to problems. This methodology is usually appropriate for organizations of 30 or more people.

If you would like to discuss the usefulness of this method in *your* organization, please telephone Major Jim Wilson, Defense Systems Management College: Autovon 354-3990, or Commercial (703) 664-3990.

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